CORPS OF ENGINEERS

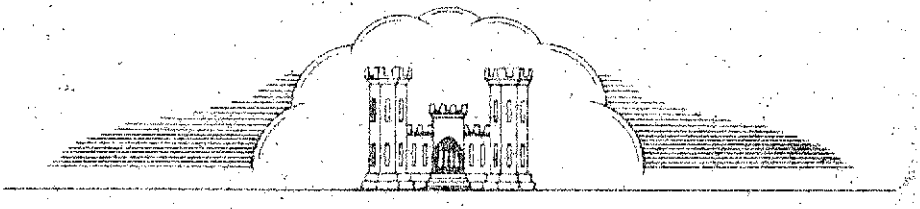
U.S. ARMY

HURRICANE SURVEY

CHESAPEAKE BAY

POTOMAC AND RAPPAHANNOCK RIVERS

APPRAISAL REPORT



OFFICE OF THE DISTRICT ENGINEER

WASHINGTON DISTRICT

WASHINGTON 25, D.C.

JUNE 1956

9

CORPS OF ENGINEERS, U.S. ARMY
Office of the District Engineer
WASHINGTON DISTRICT
First and Douglas Streets, N. W.
WASHINGTON 25, D. C.

HURRICANE SURVEY

CHESAPEAKE BAY

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HURRICANE SURVEY

CHESAPEAKE BAY, POTOMAC AND RAPPAHANNOCK RIVERS

APPRAISAL REPORT

JUNE 1956

CONTENTS

S Y L L A B U S

Approximately 80 tropical hurricanes have passed through the Chesapeake Bay area since 1889. Damages resulting to property from high tidal surges and wave action accompanying the hurricane storms have been found to consist of shoaled navigation channels, inadequate drainage of low-lying farm and residential areas, erosion of beaches and banks and destruction of waterfront property in residential and recreational areas.

Further studies of survey scope are recommended as follows: (1) Colonial Beach, Virginia, to determine type and economic justification for waterfront protective structures; (2) Garden Creek, Virginia, to determine means and economic justification for permanent drainage of area in which tidal surges are trapped following hurricane storms; (3) a study of the maximum probable tidal surge and its affect on the Washington Metropolitan area and; (4) development of general information and typical plans for protecting isolated beaches and banks.

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
WASHINGTON DISTRICT
WASHINGTON 25, D.C.

SUBJECT: Appraisal Report on Hurricane Problems in Washington District.

THRU: The Division Engineer, North Atlantic Division

TO: The Chief of Engineers, U. S. Army

I. INTRODUCTION

1. Authority. The basic authority for the hurricane survey is Public Law 71, 84th Congress, adopted 15 June 1955. The authority for the Appraisal Report is the "WASHINGTON DISTRICT, PLAN OF SURVEY FOR HURRICANE STUDY" submitted 20 January 1956 and approved by Indorsements, North Atlantic Division, 23 January 1956, and Chief of Engineers, 13 February 1956.

2. Purpose. The purpose of the Appraisal Report is to present a summary of the hurricane problem in the tidal area of the Washington District as determined from reconnaissance surveys and public hearings, and to present plans for continuation of the hurricane survey.

II. AREA DESCRIPTION

3. Geography. The area covered by this report includes the western shore of Chesapeake Bay in Maryland from Cove Point to Point Lookout and in Virginia from Smith Point at the mouth of the Potomac River to Wolf Trap Light and the tidal reaches of the Potomac, Rappahannock, Patuxent and Piankatank Rivers. There are numerous tidal tributaries to the Chesapeake Bay and Rivers within these areas that are affected by storm tides and waves.

4. Physiography and Geology. The area affected by hurricane storms is within the Coastal Plain Province and the exposed tidal shores throughout the area are in unconsolidated terraces. Since the Chesapeake Bay region is now in the process of submergence the shoreline of these terrace materials are subject to erosion from waves and tides. This erosion process is accelerated during hurricane storms.

5. Length of Shoreline. Within the Washington District there are about 65 miles of shoreline along the western side of Chesapeake Bay which are exposed to wind fetches ranging from 8 to 30 miles. The Potomac River has 225 miles of shoreline with 2 to 20 mile fetches and the Rappahannock River 200 miles of shoreline with 2 to 15 mile fetches. In addition to the 490 miles of shoreline listed above there are an estimated 1,000 miles of tidal shores in the smaller bays and tidal tributaries.

6. Population. The tidewater sections of the Washington District affected by hurricanes are lightly populated with the exception of the Washington Metropolitan area which is at the head of tidewater in the Potomac River. The second largest community is Colonial Beach, Virginia, with a permanent population of about 1,500 and a summer population of 5,000, increasing to 8,000 or 20,000 on weekends. There are no other incorporated towns with any appreciable exposure to tide or wave action. The 11 counties in Virginia, within the Washington District, bordering tidewater have an average population of 50 people per square mile. The part of tidewater, Maryland, in the Washington District has an average population of about 70 people per square mile.

7. Area Development. Chesapeake Bay and its tributaries supports an extensive sea food producing industry consisting of individual and organized fishing and oyster producing and processing establishments scattered throughout the area. As a general rule bases for work boats and processing plants are located in small tributaries or in areas protected from direct action of storms. The recreational facilities of the Bay compare favorably with similar facilities along the Atlantic Coast and in New England, and there are many summer homes and resort developments located along the shore lines. Large scale farming is conducted in the hinterland, however, many farms with small acreage are located adjacent to the waterways.

8. The following are military and other Federal and municipal establishments located on the shores of the Chesapeake Bay and its tributaries:

Chesapeake Bay

Patuxent Naval Air Station, Md.

Potomac River

Piney Point Torpedo Testing Station, Piney Point, Md. (Navy)
Naval Proving Ground, Dahlgren, Virginia
Marine Corps Barracks, Quantico, Virginia
Naval Powder Factory, Indian Head, Maryland
Woodbridge Radio Transmitter Station WAR, Woodbridge, Virginia (Army)
Fort Belvoir, Virginia

Potomac River and Anacostia Rivers at Washington, D. C.

Naval Research Laboratory
Bolling Air Base
Naval Air Station
Washington National Airport
Naval Gun Factory
Naval Receiving Station
Fort Leslie J. McNair
The Pentagon

9. Most of the military establishments in the wider sections of the lower Potomac River and Bay have reported erosion and waterfront property damage from wave action during recent hurricane storms. Waterfront establishments and facilities in the Washington Metropolitan area are subject to various stages of inundation and damage as a result of hurricane tides and fluvial floods.

10. Of the 48 miles of waterfront in the Metropolitan area of Washington, approximately 87 percent are under Government ownership. Commercial waterfront developments on private property and on property leased from the Government include power plants, oil terminals, sand and gravel plants, transportation lines and recreational boating facilities. The City of Alexandria located on the Potomac River about four miles downstream from Washington has a waterfront about two miles in length where commercial activities consist of a newsprint warehouse, oil terminals, fertilizer factories, sand and gravel plants, electric generating stations and recreational boating facilities.

III. HURRICANES OF RECORD

11. General. Records of the U. S. Weather Bureau show that at least 80 tropical hurricanes or remnants of tropical hurricanes have passed through the Washington District since 1889. In general, by the time the hurricane centers reach the Washington District the intensity of the storms have diminished as the result of passing overland, and sustained winds of hurricane velocity are rare. However, tidal surges accompanying hurricane storms are built up at the mouth of the Chesapeake Bay and are transmitted up the Bay and the Potomac, Rappahannock and Patuxent Rivers. Although the winds do not maintain velocities technically classed in the hurricane range, gusts as high

as 100 m.p.h. have been recorded as far north as Washington, D. C. These gusts together with gale force winds inflict considerable damage on shore lines and light frame structures. The winds moving over the long fetches of the Bay and rivers produce high waves which are destructive when superimposed on high hurricane tides. An examination of Photograph 1 appears to verify local estimates of 6 foot waves during Hurricane "Hazel" in the Potomac River at Colonial Beach, Va.

12. A study of the recent hurricanes indicates that those in which the center passed over the Chesapeake Bay and Potomac River, such as the August 1933 hurricane and "Connie" of August 1955, produced higher tidal surges than those which passed to the west of the tidewater area, such as "Hazel" of October 1954. However, little is known relative to the affect of the complicated tidal hydraulic characteristics of the Chesapeake Bay and its tributaries on the dynamic surge of hurricane tides. This matter will require further study before the affect of the path of a hurricane on the waters of the Bay can be accurately predicted. An example is the storm tide surge at the Naval Proving Ground at Dahlgren, Virginia on the Potomac River, 45 miles upstream from the Chesapeake Bay which was greater during hurricane "Connie" with the winds blowing offshore from the North-Northwest for the previous 3 hours, than it was during "Hazel" when the wind was blowing onshore from the Southeast over a fetch of 25 miles for the previous 6 hours. This would indicate that the conditions at the mouth of Chesapeake Bay may be more significant than local wind affects, and points to the need for more basic information for the Chesapeake Bay area. The four hurricanes discussed in the following paragraphs are expected to furnish the best data for general study

and sufficient damage figures for survey scope reports.

13. 23 August 1933. The hurricane of 23 August 1933 was the most destructive on record for the Chesapeake Bay area. The hurricane entered the mainland near Cape Hatteras, passed slightly west of Norfolk, Virginia, and continued North passing just east of Washington, D. C. The storm surge in the Bay and the Potomac were the highest of record and, within the Washington District, was superimposed on the astronomical high tide as it proceeded upstream. The results were tides ranging from 7.2 feet above Mean Low Water at the mouth of the Rappahannock to 11.0 feet at Washington, D. C. The mean range of tide at the mouth of the Rappahannock River is 1.2 feet and at Washington, D. C. is 2.9 feet. In addition, the winds ranged from 40 to 60 m.p.h. during this high tide which caused destructive wave action. An accurate evaluation of damage resulting from the storm is not available, but the figure accepted by the Weather Bureau at the time was $17,000,000 for the Chesapeake Bay area. This includes parts of the Baltimore and Norfolk Districts as well as the Washington District.

14. Hurricane "Hazel", 15 October 1954. Hurricane "Hazel", the second most destructive of record in the tidewater area of the Washington District, entered the mainland along the coast south of Wilmington, North Carolina, about 10:30 A.M., E.S.T., 15 October 1954, and moved rapidly northward passing over Richmond, Virginia, and Fredericksburg, Virginia, in the early afternoon. It reached Washington, D. C. about 6:00 P.M. The tidewater area of the Washington District was subjected to damaging winds, tides and waves throughout the day. The winds were from the east and southeast until the eye passed the latitude of each point. During this phase the affect was greatest along the western

shore of the Chesapeake Bay and the right banks of the Potomac and Rappahannock Rivers. Upon passage of the eye the wind shifted to the southwest at which time the highest wind velocities of the storm were recorded. The heaviest damages during this period was to the left banks of the Potomac and Rappahannock Rivers. Waves were high during this hurricane because of the southeast winds moving over long fetches. The hurricane tidal surge was not as high as that of August 1933 or that of "Connie" in August 1955, but the tidal surge was superimposed on the normal high tide. The high winds of the hurricane caused more total damage within the District than tides and waves. Damages reported for the various Counties or communities were lumped together which precludes the determination of a firm damage figure from wave action. A preliminary estimate of $5,000,000 has been set for the tide and wave damage.

15. Hurricane "Connie", 13 August 1955. The path of "Connie" through the Washington District was similar to that of the hurricane of 23 August 1933. However, the storm tidal surge was about 2 feet lower and occurred at the time of normal low tide. The damage was accordingly less than that resulting from hurricane "Hazel". There was from 6 to 9 inches of rainfall along the path of the hurricane through the tidewater area which increased the damages in areas subject to tidal flooding. The damage due to tide and wave action in the Washington District is estimated to be about $700,000.

16. Hurricane "Diane", 18 August 1955. The path of hurricane "Diane" was too far to the west of the tidal section of the Washington District to cause extensive tide and wave damage. However, heavy rainfall accompanying the hurricane caused about $8,000,000 damage

from fluvial flooding in the tributaries to the Chesapeake Bay and $2,370,000 damage to the oyster crop in the Rappahannock River due to the influx of fresh water. The rainfall increased the damage to the tidal areas still flooded from hurricane "Connie", six days previously.

IV. TYPES OF DAMAGE

17. Bank and Beach Erosion. The area encompassing the Chesapeake Bay and its tidal tributaries is in the process of submergence. The shoreline is undergoing erosion except in a few isolated localities. The recent hurricanes and other severe storms have accelerated the erosion and destroyed or damaged privately constructed bulkheads and other structures which would have otherwise been adequate for bank and beach protection.

18. Tidal Flooding. There are several low-lying areas along the Chesapeake Bay and tributaries that are subject to tidal flooding during hurricanes. In some cases the waters are washed by wave action into low areas during high tidal stages and are trapped behind barrier beaches for long periods after passage of the storm. Damages to existing crops and to farmland as a result of salt water have been reported. Specific cases of tidal flooding have been noted in the southern part of St. Marys County, Maryland, and in Mathews County, Virginia, along the Chesapeake Bay.

19. Damage to Piers and Wharfs. A great majority of the piers and wharves in the Chesapeake Bay are of generally light construction and are subject to damage by high tides and wave action.

20. Damage to Boats. Damage to small fishing and pleasure boats in the harbors along the Bay as a result of the recent hurricanes

was extensive. One yacht club owner estimated that during hurricane "Hazel" there was about $250,000 damage to boats in Monroe Bay at Colonial Beach, Virginia, which is generally considered to be a safe harbor.

21. Damage to Navigation Channels. Seven specific cases of shoaling in navigation channels as a result of hurricane storms have been brought to the attention of the District Engineer. Two of the localities reporting damage are Federal projects. Generally, damage as a result of storm action occurs in channels which are from 4 to 8 feet deep and which pass through narrow entrances into small tributaries.

V. PREVIOUS REPORTS

22. There are no previous reports dealing specifically with the hurricane problem in the tidewater area of the Washington District. The reports submitted on the floods of 15 October 1954 and of August 1955 which were caused by hurricane induced rainfall in the tributaries to Chesapeake Bay, were confined to accounts of fluvial flooding. A Preliminary Examination for Flood Control, Garden Creek, Mathews County, Virginia, dated May 1942 describes tidal flooding during the hurricane of 23 August 1933 at that location.

VI. SCOPE OF CURRENT INVESTIGATIONS

23. Public Hearings. Public hearings were held at three locations throughout the tidewater area of the Washington District as follows: A public hearing held at Colonial Beach, Virginia, on 8 February 1956 considered problem areas on the Virginia shore of the Potomac River from Arlington in the vicinity of Washington to Smith Point at the mouth of the river. Damage by hurricane "Hazel" in the

town of Colonial Beach, totalling approximately $500,000, was described and testimony on the need for some form of protection works was given. The Weather Bureau described the various types of warning services used to inform residents of hurricane storms and indicated that further studies were progressing to improve the warnings for high tidal stages. The town of Colonial Beach offered its services in reading and reporting tide gauge readings during storm periods.

24. Other damage areas described in correspondence and at the hearing included the Naval Proving Ground at Dahlgren, Virginia, Mason Neck subdivision on the south bank of Gunston Cove, Virginia, Sandy Point, Coles Point and Virmare Beach all located on the Virginia shore of the Potomac River. Damages in these areas were principally from eroding beaches and caving banks which will eventually endanger homes and cottages located near the edges of banks.

25. A public hearing held at Saluda, Virginia, on 9 February 1956 considered hurricane damage in the Rappahannock River area and along the western shore of Chesapeake Bay between Smith Point and Wolf Trap Light. Requests were made for improvements to the navigation channels into Queens Creek, Meachims Creek, and Jackson Creek, Virginia. It was the opinion of watermen that channels had been damaged by previous storm action and as a result, boats, not able to enter the creeks immediately before or during the later storms, were lost or damaged. The loss of approximately 10 summer cottages at Lowrey Point on the Rappahannock River near Tappahannock was described. Damage in this instance resulted from wave and wind action in an area of low elevation where all buildings destroyed were located on the low beach only several feet from the shore line.

26. Beach and bank erosion resulting from hurricane storms was indicated to be a major problem throughout the area. Locations at which the erosion is severe and in which damage to homes and summer cottages is likely to result were described at Corrotoman River, Stingray Point, Gwynns Island, and Urbanna, Virginia. A major drainage problem resulting from hurricane storms exists in Garden Creek, Virginia, where water, driven by high winds during high tidal stages, enters a residential and farming area and is trapped by barrier beaches enlarged by wave action. A description of the area and the problems involved are given in subsequent paragraphs.

27. Hurricane damages along the lower Potomac River, Patuxent River and Chesapeake Bay in southern Maryland were discussed at a public hearing held in Leonardtown, Maryland, on 14 February 1956. Storm damages at two Naval installations, The Naval Powder Factory at Indian Head on the Potomac and the Patuxent Naval Air Station on Chesapeake Bay were described as consisting of shore line erosion and washouts of roads, bridges and railroad tracks from interior drainage. Wind driven water from Chesapeake Bay trapped in Tanners Creek and Deep Creek as a result of storm action was said to create a health hazard and damage to farm lands. At Scotland Beach, a shore line eroded by annual storms has left a row of summer cottages within a few feet of the normal high tide line. Approximately eight of these buildings were damaged by waves and winds during the hurricanes of 1954 and 1955.

28. Damages to State roads at Point Lookout and St. Georges Island resulted in interruption to traffic. Damages have been repaired and plans are being made by the State of Maryland for more positive

protection at these points. Serious beach and bank erosion problems were reported at Point No Point on Chesapeake Bay and at Solomons Island on the Patuxent River. Residents of St. Georges Island and other areas subject to inundation by high tides requested more positive warnings of storm tides for evacuation of persons and livestock.

29. Briefs of the information presented at public hearings and copies of correspondence received are contained in the appendix herewith. Transcripts of the hearings are being furnished under separate cover. All areas in Virginia and Maryland in which storm damages was reported at hearings or in correspondence, and in which it was considered that possible justification could be found for protective structure, were visited during a general reconnaissance of the tidewater area.

VII. DISCUSSION

30. Damages resulting to property in the Chesapeake Bay area from hurricane storms have been found to consist of shoaled navigation channels, inadequate drainage of low-lying farm and residential areas flooded during high tidal stages, erosion of beaches and banks from wave action, and destruction of property in residential and recreational areas. It is believed that the provision of improved channels, even though partially justified on the basis of reducing damages during storm periods, should be considered under the normal river and harbor procedures. Thousands of summer homes and cottages are located along the shores of the Bay and its tributaries. Generally, buildings are located close to the edge of banks which rise from the landward edge of a beach and are from 5 to 15 feet high, although in several areas it was observed that houses had been constructed within a few feet of the normal high water shore line. The erosion of shore

lines and consequent caving of banks, which is a normal process throughout the Bay area has been considerably accelerated by the hurricanes of recent years.

31. Make-shift jetties consisting of sewer pipes or lightly constructed timber groins built by individual property owners have failed to withstand the hurricane storms; and bulkheads constructed for the purpose of protecting back-beach banks are inadequate because of improper planning and design. Of the few concentrated areas of summer homes in the Chesapeake Bay area of the Washington District, there are none that appear to be of sufficient value to warrant the consideration of a Federal project to protect the beaches and banks from future hurricane storms. In this respect it is considered appropriate that a special study be made to assemble general information on beach and bank protection which can be furnished individuals or communities which may not be able to qualify for Federal protection projects. It is considered that this procedure falls within the intent of Public Law 71 in furnishing assistance to the public in alleviating damages resulting from hurricane type storms. Areas in which the provision of a Federal protection project appear to be justified and for which further study is recommended are discussed in the following paragraphs.

VIII. RECOMMENDATIONS FOR ADDITIONAL SURVEY

32. Colonial Beach, Virginia. Colonial Beach is located on the west side of the Potomac River 40 miles upstream from the Chesapeake Bay and 70 miles downstream from Washington, D. C. The town occupies a low peninsula between the Potomac River and Monroe Creek and has a

shoreline of about 2½ miles along the Potomac River. The river is 3 to 4 miles wide opposite the town and the waterfront is exposed to a 25 mile wind fetch to the southeast. The shore development along the Potomac River front in Colonial Beach is similar to that of the small Atlantic coastal resorts and includes moderate priced summer homes, permanent homes, hotels, and amusement places. Because of the large number of summer homes, the developed area of the town is large in proportion to the permanent population of 1,500. The summer population is estimated at 5,000 with an increase to 8,000 over weekends. The town serves a commercial seafood fleet of approximately 150 vessels and is a base for about 150 pleasure boats. The harbor in Monroe Creek is visited annually by 500 to 600 pleasure craft.

33. The hurricane damage to the community includes erosion to streets and sidewalks along waterfront, destruction of piers and buildings built on piers, and tidal flooding of homes, business establishments and the sewage system. (See photographs 1 and 2). The damage to Colonial Beach from the August 1933 hurricane was estimated at that time to have been in excess of $200,000, which at present day prices would total $820,000. Hurricane "Hazel" caused about $500,000 damage and "Connie" about $50,000.

34. There is an authorized Beach Erosion Control Project (House Document 333-81-1) for Colonial Beach, which has been held in abeyance until certain conditions of local cooperation have been met. This project is designed to protect about 7,000 linear feet of State highway along the waterfront against a "3 year" storm. Assurances of local cooperation have now been given and arrangements are being made to budget for the Federal share of the cost of construction.

35. It is recommended that a survey of the Colonial Beach area be authorized which would include: (1) consideration of a sea wall along that part of the Potomac River side of the town not protected by the existing shore protection project, and (2) modification of the existing project to provide additional protection from hurricane type storms. It is not considered at this time that a seawall encircling the town to provide complete protection against high tides is feasible.

36. Garden Creek, Mathews County, Virginia. Garden Creek is a small tidal estuary on the western shore of Chesapeake Bay opposite Wolf Trap Light and about 45 miles north of Norfolk, Virginia. The drainage area of about 10 square miles has a maximum elevation of 11 feet above mean low water. About 47 percent of the area is farmland, 40 percent woodland and the remainder marsh and other wasteland. The population within the drainage area is about 1,000 and is primarily rural with a few small communities.

37. The Garden Creek area is typical of the low-lying agricultural lands along the Chesapeake Bay which are subject to tidal flooding during hurricanes and other severe storms. Records indicate that there have been several entrances to the creek during the past 100 years. There has been a continuous effort on the part of local residents to maintain an opening from Garden Creek into the Bay. Timber jetties constructed in 1933 under C.W.A. programs were destroyed in 1936, again in 1938 and by 1941 the jetties had deteriorated to the point where they were no longer effective. The artificial channel connecting Garden Creek with Chesapeake Bay has since been closed by shoaling as the result of storm action. There is at present a small artificial drainage ditch extending southward to Winter Harbor from

which there is an adequate outlet to the Bay. Hurricane tides and wind driven waves rise above the barrier beach, which varies in height from 4 to 6 feet above mean low water and flood the agricultural lands and residential areas with salt water. Tidal waters, together with the excessive rainfall associated with the hurricanes, stand for long periods destroying crops and farmlands and creating health hazards by flooding wells and sewage disposal facilities. The maximum tide at Garden Creek during the 1933 storm was 7.1 feet above mean low water, and during "Connie" in August 1955, about 5.5 feet.

38. A Preliminary Examination Report for Flood Control for Garden Creek, submitted 9 May 1942 presented the following tabulation of damages for the tidal flood of August 1933.

Item	Direct Damage	Indirect Damage	Total Damage
Agricultural	$253,000	$ 50,600	$303,600
Residential	31,000	12,400	43,400
Commercial	40,000	28,000	68,000
Highway and Bridges	40,000	40,000	80,000
Public Utilities	2,000	2,000	4,000
Total for Watershed	$366,000	$133,000	$499,000

Converted to present day prices this damage would be in excess of $1,200,000. Damage figures for flooding from hurricane "Connie" and "Hazel" are not available, but a comparison of the tide elevation with that of 1933 indicates that damage would be about $100,000 for "Connie" and $50,000 for "Hazel".

39. The Preliminary Examination Report for Flood Control for Garden Creek concluded that the main source of damage was from storm tides and that protection of the area as a flood control project was

not economically feasible and did not recommend a survey. However, since the main source of damage is from hurricane tides and hurricane associated rainfall and the recent hurricanes have increased the average annual damages, it is recommended that a study of survey scope be made of the Garden Creek area under the hurricane survey program. It is considered that such a study would serve as a guide for developing plans for similar areas along the Chesapeake Bay.

40. Metropolitan Areas. The hurricane storm of August 1933 produced a record tidal surge in the Potomac River which reached an elevation of 11 feet above mean low water at Washington. Assuming that the maximum possible tidal surge at Washington could reach an elevation of 20 feet above mean low water, inestimable damage from inundation would result along the waterfronts at Washington and Alexandria and at such installations as Naval Researth Laboratory, Bolling Air Base, Washington National Airport, Naval Gun Factory, Fort Leslie J. McNair, portions of the Pentagon facilities and other Federal and municipal installations. While it is not considered economically feasible to provide complete protection against hurricane induced tidal surges in the Washington Metropolitan area, it is recommended that the matter be investigated and studied, in conjunction with other problem areas being considered under Public Law 71, to determine the maximum storm tide which would be possible in the Washington area, and its affect on commercial and Government installations.

41. Special Studies. A special study to develop general information and typical plans and specifications for use by individual property owners and small communities in the construction of beach and bank protection works is recommended. Bank and shore erosion

problems within the Chesapeake Bay area are a serious and costly problem to individual property owners and when considered collectively the economic loss to the area is large. The District Engineer has received numerous requests for assistance in bank and beach erosion control ranging from engineering advice to construction of protective works. Since Public Law 71 does not provide for construction of protective works, and Federal participation in the many isolated areas subject to storm damage in the Chesapeake Bay area appears improbable in the near future, it is believed that a bulletin type pamphlet containing general and basic information and typical plans, specifications and cost estimates based on the latest design criteria would be of value to individuals and small communities in planning and constructing their own protective structures. The study necessary to assemble such information should consider all types of storm damage throughout the Bay area and should be coordinated with the Beach Erosion Board in order to obtain technical assistance and to avoid duplication of effort or overlapping of functions.

/s/ George B. Sumner

GEORGE B. SUMNER
Colonel, Corps of Engineers
District Engineer

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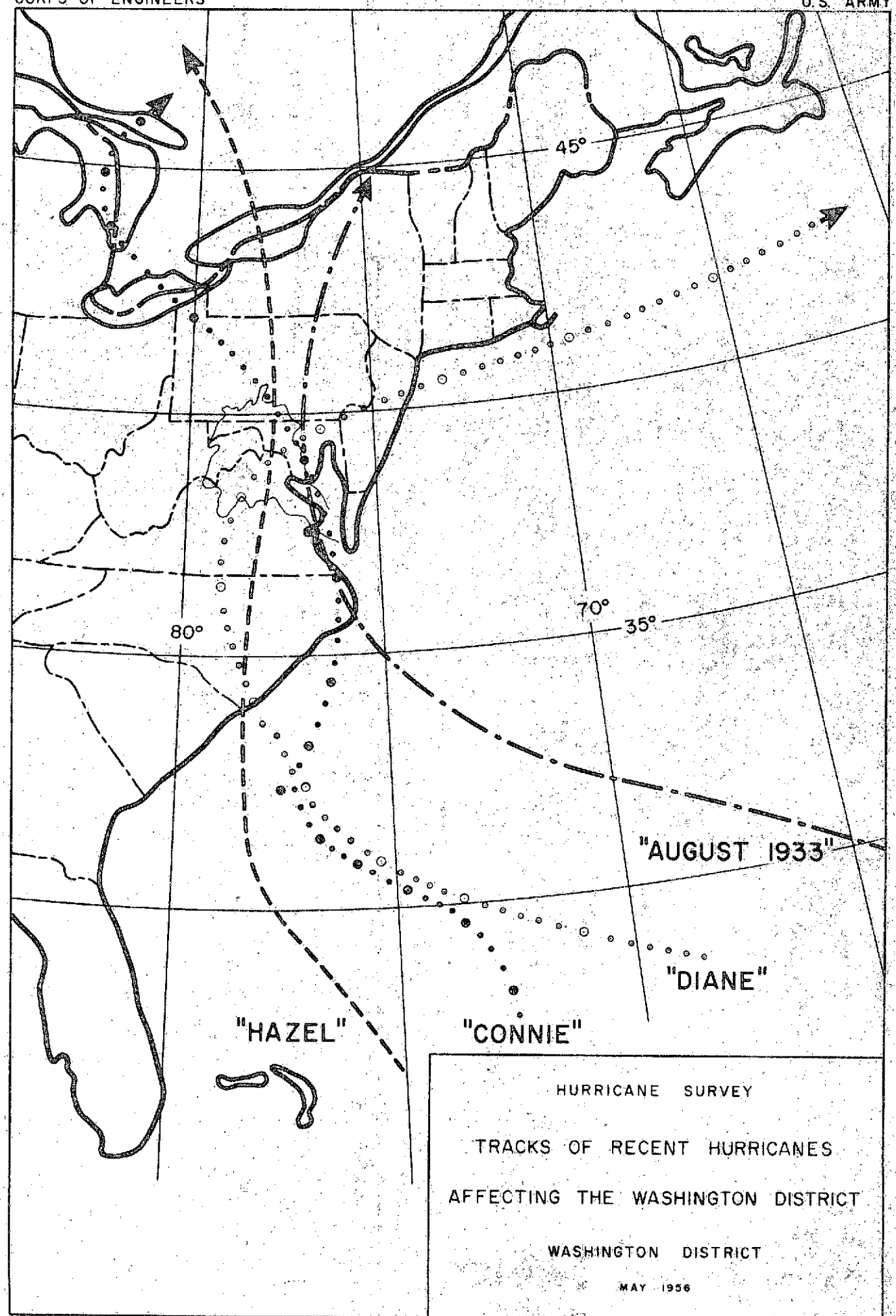


HURRICANE SURVEY

TRACKS OF RECENT HURRICANES

AFFECTING THE WASHINGTON DISTRICT

WASHINGTON DISTRICT

MAY 1956

FIGURE 1

CORPS OF ENGINEERS U.S. ARMY

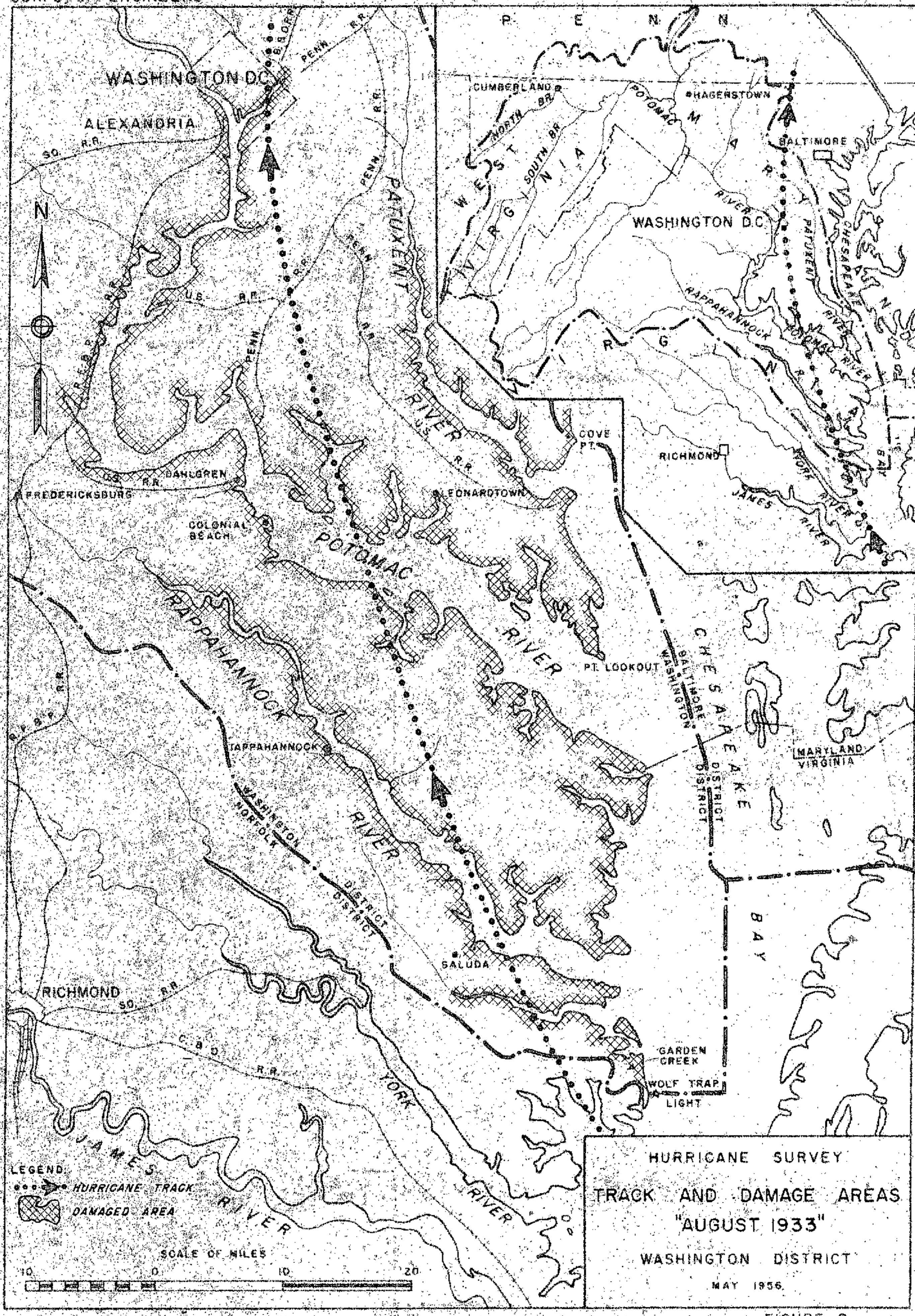
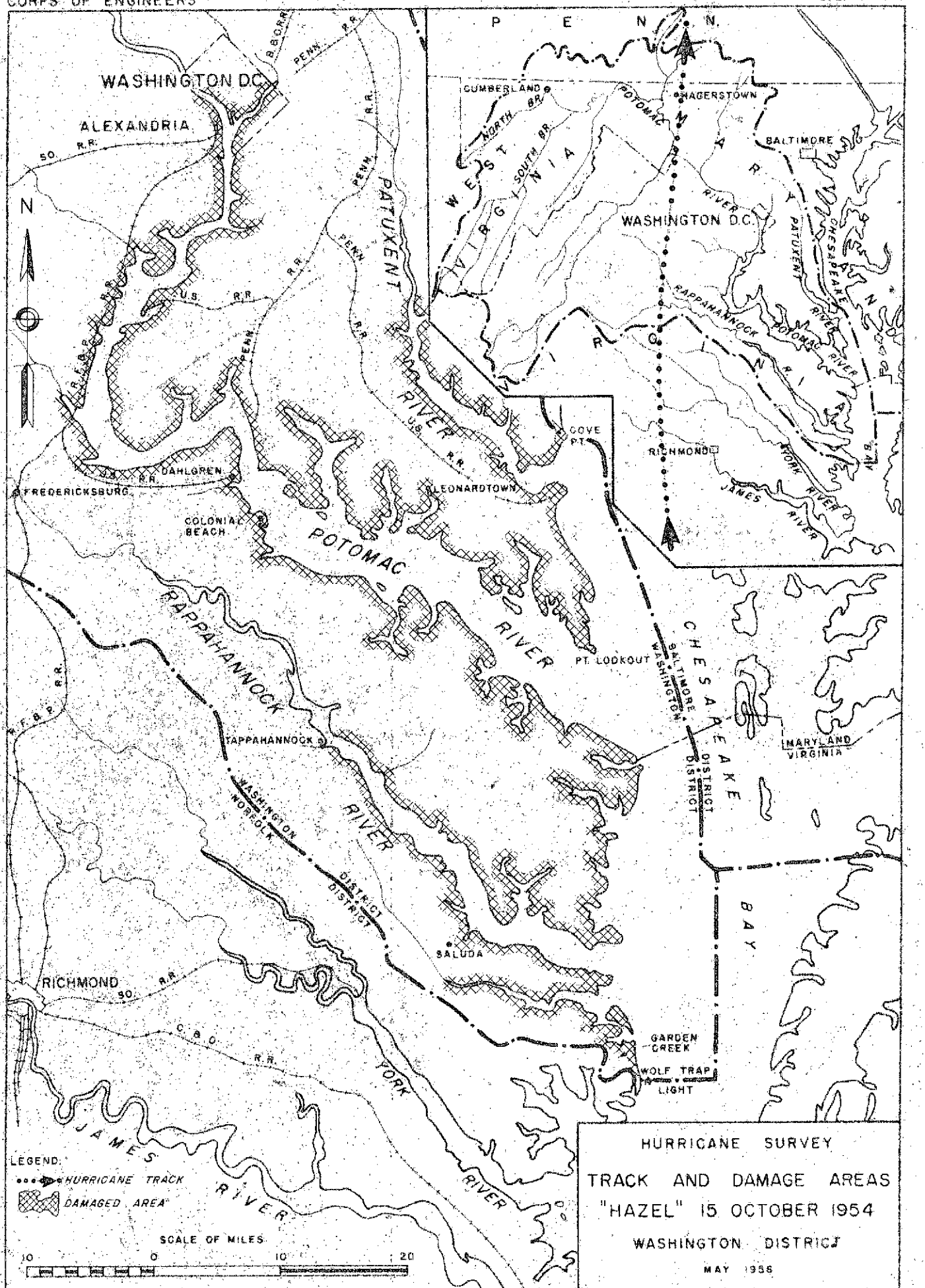


FIGURE 2



HURRICANE SURVEY

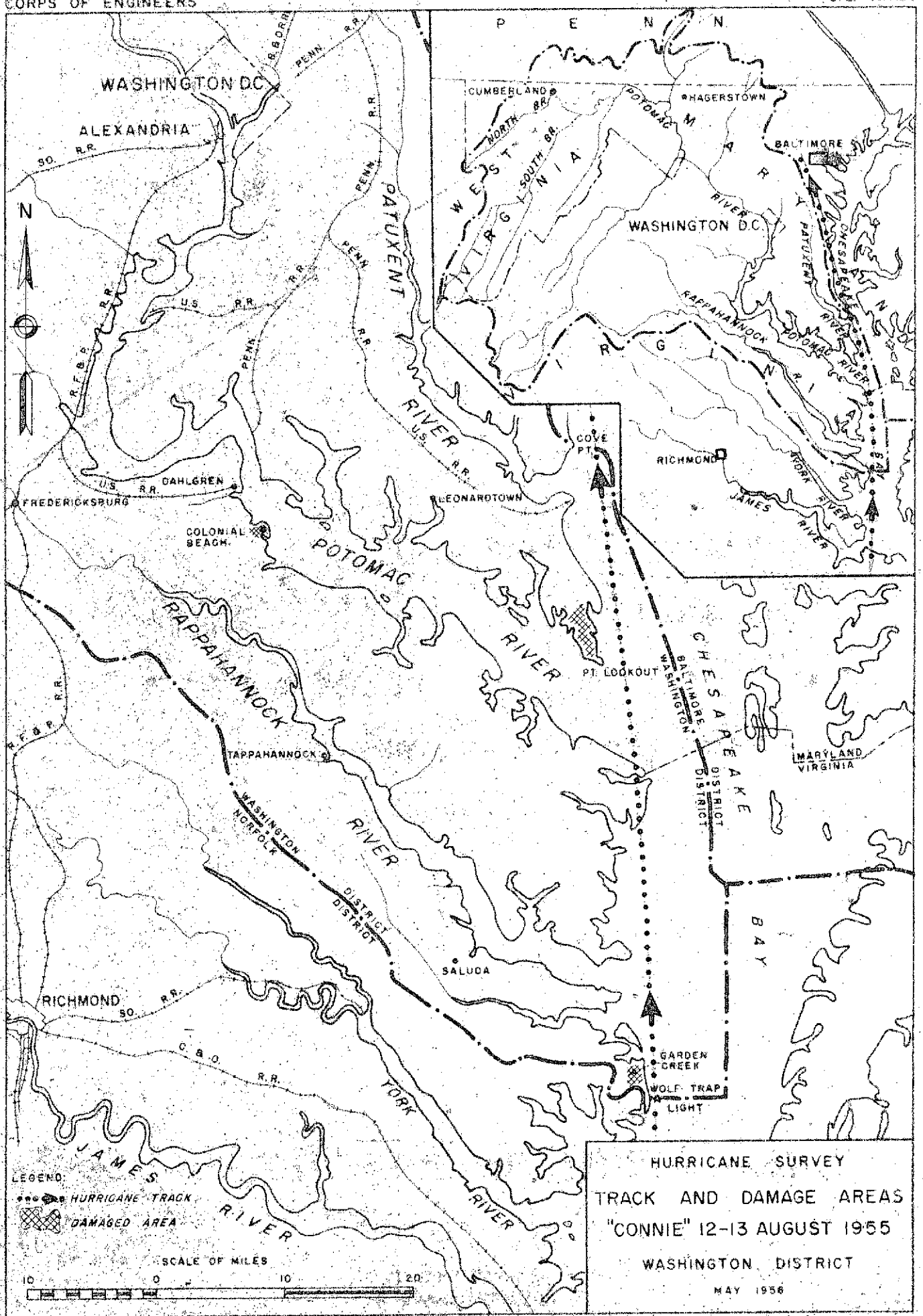
TRACK AND DAMAGE AREAS

"HAZEL" 15 OCTOBER 1954

WASHINGTON DISTRICT

MAY 1955

FIGURE 3



HURRICANE SURVEY

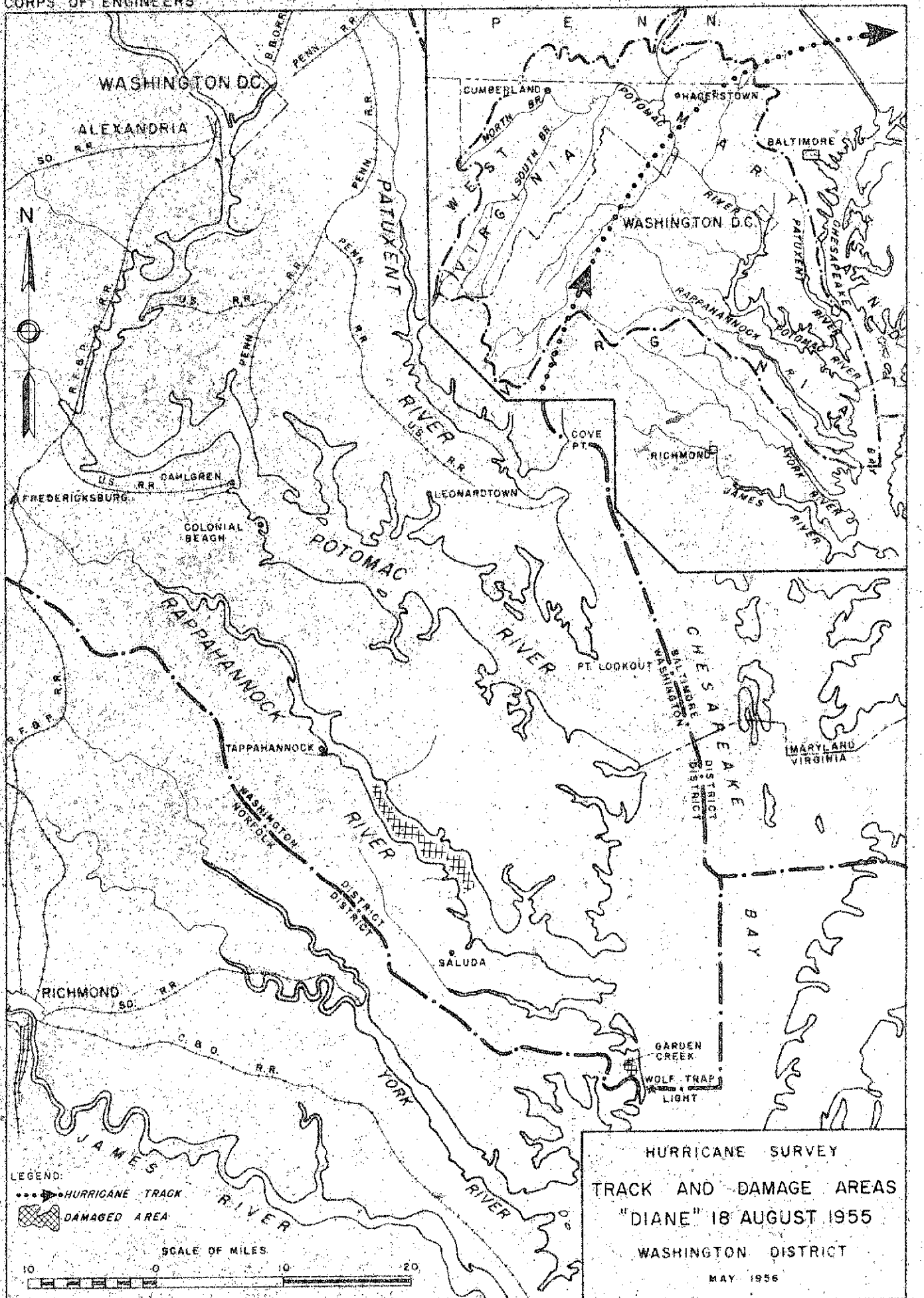
TRACK AND DAMAGE AREAS

"CONNIE" 12-13 AUGUST 1955

WASHINGTON DISTRICT

MAY 1956

FIGURE 4



HURRICANE SURVEY

TRACK AND DAMAGE AREAS

"DIANE" 18 AUGUST 1955

WASHINGTON DISTRICT

MAY 1956

FIGURE 5

Photograph 1 Colonial Beach, Virginia During Hurricane "Hazel" 15 October 1954

Photograph taken near height of storm. Wind from southeast over 20 mile fetch with average velocity probably near 40 m.p.h. for several hours. The building in the background was destroyed.

Photograph 2 Damage at Colonial Beach, Virginia from Hurricane "Hazel" 16 October 1954

Photograph 3 Damage to Bank by Hurricane "Hazel" 15 October 1954

At Marine Corps Air Station on the right bank of Potomac River located about 75 miles upstream from the Chesapeak Bay. October 1954

Photograph 4 Beach Homes at Lowery Point, Virginia After Hurricane "Hazel".

These beach homes are set on a low point on the right bank of the Rappahannock River about 40 miles upstream from the Chesapeake Bay and are exposed to waves generated over a 15 mile fetch to the southeast. Shows results from building too near the shoreline.

29 October 1954

Photograph 5 Right Bank Potomac River Near Coles Point 7 March 1956

Shows bank erosion typical of the Potomac River and Western Shore Chesapeake Bay. The existing creosoted timber wall is inadequate to protect against Hurricane driven tides and winds.

HURRICANE SURVEY

CHESAPEAKE BAY, POTOMAC AND RAPPAHANNOCK RIVERS

APPRAISAL REPORT

JUNE 1956

APPENDIX A

BRIEFS OF PUBLIC HEARINGS

CONTENTS

BRIEF OF PUBLIC HEARING AT COLONIAL BEACH, VIRGINIA, 8 FEBRUARY 1956
RELATIVE TO HURRICANE DAMAGE IN COLONIAL BEACH AND POTOMAC RIVER AREA.

Hurricane "Hazel" inflicted greatest damage to Town of Colonial Beach. Insurance claims numbered 110 of which 25, representing damage from water, were not insurable. All property south of New Atlanta Hotel was damaged. Sewerage system flooded..... Pgs. 3-4

Protection of Irving Avenue is problem. Beach and shore line have receded. Houses at south end of town damaged slightly from wind driven water. Approximately $500,000 storm damage in Town of Colonial Beach..... Pgs. 4-5

Waterfront roads, streets and sidewalks damaged during "Hazel", "Connie" and "Diane". Approximately 30 feet of bank washed out in front of houses at north edge of town. All amusement piers except two demolished..... Pgs. 5-8

More damage in 1954 ("Hazel") than in 1933 due to growth of town since 1933..... Pg. 8

Large amusement pier valued at 25 to 30 thousand dollars demolished during "Hazel"..... Pg. 9

Water washed over road at south of town, wetting foundations and lower floors of houses. Furnaces damaged..... Pg. 10

Water 1 to 2 feet higher in 1933 than 1954 ("Hazel")..... Pg. 12

Newspaper accounts show 2 million dollar damage at Colonial Beach in 1933..... Pg. 13

Virginia Department of Highways constructed sloping concrete wall for distance of 1,000 feet along bank between Irving Avenue and river to protect roadway. Cost $25,000. Constructed after "Hazel". Wall was not damaged by "Connie" or "Diane". State plans to continue wall toward southern end of town to protect highway under four year program costing an additional $100,000. Work would protect same area covered by approved Federal beach erosion project..... Pgs. 15-17

Hurricanes have shoaled Federal channel project into Monroe Bay ..... Pg. 18

Naval Proving Ground at Dahlgren, Va. (5 miles north of Colonial Beach) suffered damage from "Hazel" estimated at $656,000, primarily from wind which registered maximum of 71 knots. Water height was 6.2 feet above mean low water. "Connie" showed maximum of 41 knots and water height of 4.7 feet. Highest wind velocity during "Diane"

BRIEF OF PUBLIC HEARING AT SALUDA, VIRGINIA, 9 FEBRUARY 1956 RELATIVE TO HURRICANE DAMAGES IN RAPPAHANNOCK RIVER AND CHESAPEAKE BAY AREAS.

Jackson Creek, Va. - Storms have shoaled the Federal project into Jackson Creek. Entrance by small boats is difficult. Dikes or jetties to the east and west of the entrance channel suggested..... Pg. 4-5

Queens Creek, Mathews County, Va. - Storms have shoaled entrance to Queens Creek. Oystermen cannot get into creek to sell oysters..... Pg. 5-8

Oyster damage - Opinions given that surge of water from Fredericksburg area during hurricane storms caused extensive damage to oysters in lower Rappahannock River. Believe proposed Salem Church dam would have regulated flow..... Pg. 8-9

Meachims Creek, Va. - Petition forwarded through Board of Supervisors, Middlesex County, to Public Works Committee requesting improvement of Meachims Creek. Channel damaged by hurricane "Hazel". Depth of $2\frac{1}{2}$ feet was shoaled to one-half foot..... Pg. 9-10

Garden Creek, Va. - Several square miles inundated for four or five days by flooding due to entrance closed by storm action. Water 6 inches to 1 foot deep over all roads. Farms soaked by salt water. About 50 homes and 600 persons affected. Mouth of creek should be opened to permit proper drainage..... Pg. 11-15

Corrotoman River, Va. - Between Moran and Taylors Creek. Six or eight homes endangered by caving bank..... Pg. 15-16

Lowery Point, Va. - Approximately 10 summer cottages were severely damaged by wind and wave action during Hurricane "Hazel". Water 3 or more feet deep in marsh behind beach. Waves 3 - 4 feet higher. Most of damages were from wave action which is not insurable..... Pg. 16-18

Gwynn's Island, Va. - Between 20 and 25 feet of shore line lost on the northeast corner of island. No damage to 50 cottages from wave action..... Pg. 19

Stingray Point, Va. - Damage to shore line reported. Many cottage owners have moved houses to rear of lots and except for wind damage no buildings were damaged by wave action..... Pg. 19-20

Urbanna, Va. - About 30 feet of bank on Rappahannock River at edge of town has been washed away by storms since 1933. Ten or twelve homes must move if protection is not provided. One lot owner estimates cost of $2,000 to protect property..... Pg. 20

General - Heights of water during the several hurricanes in the lower Rappahannock River area discussed. Storm of 1933 highest. Several offers made for volunteer services for reading tide gauges and reporting during tidal storms, including drawtenders on highway department bridges. More accurate predictions on storm tide heights would help prevent damage to boats and waterfront structures. Utility companies maintain stand-by crews costing $500 to $1,000 per hour, during hurricanes. More accurate warning on maximum wind velocities and timing would reduce cost. "Connie" and "Diane" missed predicted time by 12 to 18 hours..... Pg. 20

Tanners Creek, Md. - Entrance blocked by "Connie", also by "Hazel" in 1954. No drainage from creek. Entrance needs opening. Approximately 75 homes on creek, permanent population of Scotlant Beach: 50. Several hundred acres of farm land flooded and corn and wheat damaged. Health hazard..... Pg. 3-6

Scotland Beach, Md. - Foundations of hotel and cottages on beach damaged by "Connie". About $8,000 damage for one interest with 500' frontage - No total estimate of damage for entire area. Serious erosion problem along beach..... Pg. 6-7

Deep Creek, Md. - Entrance blocked by sand washed from the bay during each bad storm. Eleven farms around creek inundated. Building and barn damage from wind described. Health hazard - malaria mosquitoes breed in creek. State Roads have in past opened drainage ditches to drain creek. Watershed association has been formed. Dead fish are problem. Wells flooded..... Pg. 7-9

Maryland State Health Department testified that odor from dead fish not health hazard. Malaria type mosquito present but no cases of malaria reported in St. Mary's County in years..... Pg. 10-11

It was stated that if Deep Creek were opened for use of fishing boats it would be worth $50,000 to community. Barrier between bay and creek is 400 - 500 yards wide. Other estimates 250' wide. Entrance opened one day, closed next. About 250 - 300 acres damaged by salt water..... Pg. 12-14

Tall Timbers, Md. - County bulkhead for length of 50 - 60 feet damaged..... Pg. 14

General. - 15 - 20 feet erosion on Potomac shore. Many piers destroyed. Damage centers from hurricanes described as being Tall Timbers, Point Lookout, Scotland Beach and Seven Gables. Flood damage due to inadequate drainage is severe at Tanners Creek, Deep Creek, Breton Bay, St. Marys River..... Pg. 15

Area between Piney Point and Point Lookout, and inland about 3 to 4 miles is low (4 to 8 M.S.L.). Most of area underwater in 1933, 1954 and 1955 storms. (6,000 acres) damaged by salt water. Adequate warnings necessary for evacuation of persons and livestock..... Pg. 24-25

St. Marys River, Md. - Isolated property damage described - bulkheads destroyed - trees down - roofs off..... Pg. 15-16

Patuxent Naval Air Station, Md. - Erosion of private beaches adjacent to Naval Air Station said to total 20 feet. Believed to be due to Government construction of sea plane basin..... Pg. 33-38

Point Lookout, Md. - Damage to State road (Route 5) repaired at cost of $18,000 following "Connie" and "Diane". Seawall to prevent future damage is being planned by State at estimated cost of $60,000..... Pg. 18

Solomons Island, Md. - Seawall which retains State road is undermined and will fail during another hurricane. Erosion to shore lines throughout island should be corrected..... Pg. 19-20

St. Georges Island, Md. - 200 foot section of State Bridge washed out. $12,000 damage..... Pg. 14

Island is low. Residents isolated during storms. Roads covered by water. Want more positive warning and rescue facilities. Not feasible to put seawall around island. Water level in 1933 storm was +8' and in 1954 was +6½'..... Pg. 20-22

Naval Powder Factory, Indian Head, Md. - Damage to Government property from "Connie" was approximately $80,000. Damage was from heavy rains and washout of railroad tracks, roads and bridges. Damage during "Hazel" totalled $20,000..... Pg. 23

Piney Point, Md. - Damage to buildings and piers, mostly from wind, totalled $212,000. Want seawall to prevent sand from washing over roads in future storms..... Pg. 25-26

Hurricane Warnings - Weather Bureau requested suggestions from local interests for improving warning service. Residents would like to know where information can be obtained on predicted tidal stages. Ham radios assisted in storm predictions during "Hazel" and " Connie". Weather Bureau indicated problem of predicting tides was under study. Arrangements are about complete for State wide telephone conference hookup and coordinated radio warning service..... Pg. 27-33

HURRICANE SURVEY

CHESAPEAKE BAY, POTOMAC AND RAPPAHANNOCK RIVERS

APPRAISAL REPORT

JUNE 1956

APPENDIX B

Letters from U. S. Navy

CONTENTS

DISTRICT PUBLIC WORKS OFFICE
POTOMAC RIVER NAVAL COMMAND
U. S. NAVAL GUN FACTORY
WASHINGTON 25, D. C.

In reply refer to

H2(6)
DB-100 JAW:RSC

MAR 22 1956

District Engineer
Washington District
Corps of Engineers, U. S. Army
First and Douglas Streets, N. W.
Washington 25, D. C.

Subject: Public Hearings on the Hurricane problems along the tidal reaches of the Potomac, Rappahannock and Patuxent Rivers and the western shore of the Chesapeake Bay

Gentlemen:

Representatives of this activity and other naval activities were invited through Public Notice 501 of 12 January 1956 to attend the public Hearing in the Town Assembly Hall of Colonial Beach on 8 February 1956. In the interest of contributing any available information on the subject problem, certain data relating to wind velocities experienced at the Naval Air Station, Patuxent River over the past five years, and a sketch showing method of repairing flood erosion damage at Marine Corps Air Station, Quantico were submitted. As indicated at the Hearing, further information on the subject matters outlined in Public Notice 501 is forwarded herewith as enclosures (1) through (6).

Sincerely yours,

/s/ J. A. WHITE
Commander (CEC) USN
Acting District Public Works Officer

Encl:
(1) Character, extent and amount of damage in dollars inflicted during hurricanes "Connie" and "Diane", 1955.
(2) Control measures for natural type disasters; experience data on, taken from recent hurricanes "Hazel" and "Diane", 1955, Appendixes I, II, III & IV.
(3) Suggestions for Emergency and Permanent Protective Works, Appendixes I, II, III and IV.
* (4) Copy of ltr from CO NCS Washington to DPWO PRNC with photographs of damage at NRS, Cheltenham, Maryland.
* (5) Photographs of damage to shore line, Naval Proving Ground, Dahlgren, Va.
* (6) Photographs Nos. 1874, 1875, 1876, 1878, and 1880 showing damage by hurricane "Hazel" to shoreline at Marine Corps Air Station, Quantico, Va.

* Enclosures (4) (5) and (6) were not reproduced for this report

Extent and amount in dollars of damage
inflicted during hurricanes "Connie" and "Diane", 1955

All naval stations within the Potomac River Naval Command were contacted and advised to report measurable damage caused by the subject hurricanes. Most stations suffered both minor and major damage. Cost of minor damage or the type including such items as fallen trees, broken windows, minor flooding of basements, pipe tunnels, manholes, and interruption of utility and service lines was not reported. These damages and the cost thereof were corrected by available maintenance forces and with regular maintenance and operating funds. Major damage beyond capacity of regular maintenance forces and funds was reported as follows:

Naval Powder Factory, Indian Head, Maryland:

Three railroad culverts washed out and railroad ballast washed out over a stretch of four miles.

Cost of repairs - culverts $60,000, ballast $20,000.

Naval Research Laboratory, Chesapeake Bay Annex, Chesapeake Beach Maryland:

Supports washed out from beneath electrical transformers.

Cost of repairs - $1,500.

Naval Radio Station, Cheltenham, Maryland:

Security fencing washed out.

Cost of repairs - $2,500.

Naval Air Station, Patuxent River, Maryland:

Railroad bridge washed out and general beach erosion on Patuxent River and Chesapeake Bay perimeter of station.

Cost of repairs - railroad bridge $14,325; permanent erosion control measures to protect building structures, roads and bridges, and retain shore line - $1,000,000.

Control Measures for Natural Type Disasters, experience data on, from recent hurricanes "Hazel" and "Diane", 1955

1. Attached hereto as appendixes I, II, III and IV are reports of action taken during recent hurricanes "Hazel" and "Diane".

2. Appendix I is a general summation of the type of damage inflicted, and suggested measures to lessen the effects of hurricane damage by long range preparation, as well as measures that assist materially in restoring services more promptly if the measures are placed into effect immediately prior to the hurricane.

3. Appendix II is a sample of actual emergency steps taken at U. S. Naval Proving Ground, Dahlgren, Virginia, on receipt of hurricane warnings.

4. Appendix III - action taken and report of damage at U. S. Naval Air Station, Patuxent River, Maryland.

5. Appendix IV - Comments and experience data, Naval Gun Factory, Washington, D. C.

6. In addition to the above, much valuable data can be obtained from Bureau of Yards and Docks publication TP-PL-18.

H4(1)
DC-400 WLM:dmj 14 January 1956

From: District Public Works Officer, Potomac River Naval Command
To: Chief, Bureau of Yards and Docks
Via: Commandant, Potomac River Naval Command

Subj: Control Measures for Natural Type Disasters; experience data on

Ref: (a) BuDocks Notice 11155 of 6 December 1954

1. Reference (a) requested information on control measures for natural type disasters. The experience in this District in protecting against natural type disasters has been confined to Hurricane Hazel. The major damage inflicted from this source was to roofs and shore erosion. Falling trees blocked roads, damaged power, telephone and above ground steam distribution lines and security fences. Planking was torn off of piers and boat houses. Other structural damage was slight due to good construction methods. The greatest handicap experienced was the failure of power and communication facilities. The Public Works Officer of the Naval Gun Factory has advised that he is submitting a report of his experiences and findings. Upon receipt in this office his report will be forwarded to the Bureau of Yards and Docks. The findings and recommendations that follow are the results of the combined experiences of other Public Works Offices within this command.

2. As an example of the type of damage inflicted it is noted that at one activity low pitched built-up roofs suffered the most extensive damage, while a greater portion of asphalt shingle roofs were damaged at this activity only minor repairs were required and replacement of a few shingles restored these roofs. It is believed that the damage to the built-up roofs was caused by inadequate fastening of the first layer of felt. In some instances roofs were laid on gypsym decking or insulating board and the nails did not penetrate far enough to hold. In other instances the first layer of felt over wood or concrete decks was not fastened down. In new construction over wood plank this first layer of felt should be securely nailed; where over concrete deck the first layer should be cemented down with asphalt or pitch. There were some sheet metal roofs lost. These sheets were fastened with a clinch type nail. More adequate fastening should be used in new construction. There was a variance between activities of which type roof suffered the most damage and therefore no conclusions can be drawn from the limited information available. The copper expansion joint cover on some concrete arch type hangars was blown loose and out of shape. This copper had been fastened on one side only. It is suggested that a modified type cover with an expansion fold which can be fastened on both sides be used on new construction. Some cinder block buildings in the area lost their entire roof along with the top row of block. This was not a failure of the material but rather of the type of construction

as the roofs were anchored through the top blocks only. Gutters and downspouts and some awnings were damaged. No towers were reported damaged. Generally the buildings damaged were metal prefabs, shed type buildings with a wood frame or with pipe columns and one-family quarters with crawl spaces.

3. It is believed that the damage experienced from Hurricane Hazel could not have been prevented by emergency field measures and it is not economical nor practical to try to provide for all contingencies. However, there are accepted practices that tend to alleviate the damage and facilitate the restoration of services. Upon warning of the approach of a natural type disaster it is recommended that the following things be done:

a. Determine predicted height of flood or tide crest.

b. Make preliminary inspection of all facilities - check most vulnerable areas for possible water damage.

c. Tie down and stow loose gear, pay particular attention to residential areas (secure awnings).

d. Check emergency generators, put them in readiness (check fuel etc.). Make tentative plans of which services could be kept on.

e. Aircraft should be sent out of the area (not usually a public works responsibility).

f. Watercraft should be moored in the safest harbor available. Moorings and lines should be checked.

g. Secure bridge cranes.

h. Put construction and transportation equipment in readiness (i.e. gas up, check tires).

i. Spot radio cars around station so that radios can be used in event of telephone failure.

j. Park vehicles in safest places; not under trees or other areas where they are likely to be damaged by falling objects. Put breaks on and leave vehicle in gear.

k. Put portable lights in shelter and vulnerable areas.

l. Where possible, evacuate machinery in areas likely to be flooded.

m. Break out foul weather gear.

n. Advise contractors and inspectors working on the station so that where possible work under construction can be protected.

o. Retain standby crews. When justified by the nature of the emergency send the rest of the personnel home.

p. Power, communication and overhead steam lines and security fences should be cleared of hazardous trees and branches. This should be a continuing maintenance practice as there is seldom enough time after receipt of a hurricane warning to do this job effectively.

4. In discussing control measures for natural type disasters it was pointed out from many sources that the best measures that can be provided is pre-planned organization. The consensus of opinion was that a mixed disaster crew including at least electricians and carpenters was the most desirable. Chauffeurs and crane operators should also be available. It is considered desirable to have emergency shelters designated in the event some houses have to be evacuated. Messing facilities should be made available as should arrangements for transportation home for the men in the disaster crews.

5. Necessary tools, equipment and materials should be available to these crews. Brief representative lists of these items follow:

Tools & Equipment	Materials
Cranes, portable Lights,	Roll roofing
Trucks, Demolition Gear,	Metal sheets
Cars, Welding Gear,	Asphalt or Pitch
Gasoline Chain Saws	Sheeting or
Other emergency tools	Plywood
such as:	Line materials
Hatchets, Shovels, etc.,	Shore Fittings
Saws, Foul Weather Gear	

6. In regard to the specific question of whether or not the use of panels to cover windows has been effective it is noted that in this area damage to glass was very slight. Panels to cover windows were not needed or used during this hurricane. The expense of such protective measures is therefore not considered justified in this District.

7. In regard to the use of sand bags there has been very little experience in this District. Sand bags were considered of very little protection against hurricane driven waters and were not used during "Hazel". This District is not subject to high floods. However, where power plants and fresh water pumping plants are in positions vulnerable to floods it is believed that sand bag protection should be used where applicable and necessary. Personnel, equipment and furniture should be moved out of low areas which are expected to be flooded.

8. From a review of the records it appears that, in this District, Air Stations are the most vulnerable to hurricane type disasters.

R. W. SCHEPERS

PUBLIC WORKS DISASTER CONTROL MEASURES DISCUSSION COPY
U. S. Naval Proving Ground, Dahlgren, Va.
Mr. W. L. Morley and Lt. A. C. Beard

28 December 1954

I. Predisaster arrangements upon receipt of condition 2A:

A. Public Works Disaster Control Center activated.

B. Five standby emergency crews alerted and designated emergency equipment readied.

(1) Team Composition:

3 Carpenters
2 Riggers
2 Electricians
1 Welder
1 Truck Driver/Equipment Operator
10 Laborers

(2) Designated Emergency Kit Containing:

Hand tools
Chain saws
Wire Rope
Portable generators, communication and emergency lighting equipment
Foul weather gear
Transportation vehicles and equipment (radio-equipped taxis and trucks, when possible)

C. Area reconnaissance by Public Works Department personnel to determine that:

(1) All loose gear is secured where possible.

(2) Potential danger areas (locations vulnerable to wind and water damage) are located and control measures initiated.

D. Implement the Public Works Disaster Organization within the Station organization with as little friction as possible and establish stationwide communications and transportation facilities.

File A 25
Ser 82-20

U. S. NAVAL AIR STATION
Patuxent Rv. Maryland

C O P Y

January 12, 1955

From: Commanding Officer
To: Commandant, Potomac River Naval Command (Code 43)

Subj: Disaster Control Measures

Ref: (a) PRNC DPWO Notice 11155 of 17 December 1954

1. Reference (a) requests data on physical measures that have proved effective in curtailing or reducing damage by natural type disasters. The following action was taken on this station just prior to Hurricane "Hazel":

a. All possible loose material was tied down or secured in some manner.

b. All vehicles that could not be placed inside were parked in gear and with emergency brakes "on".

This action was taken after the storm warning was received. No action such as building panels to cover windows or the use of sand bags has been taken at this station. Based on past experience it would be impractical to construct panels to cover windows to prevent damage from Hurricane type disaster. Hurricanes are not frequent in this area and very little damage, which might have been prevented by covering windows, occurred on this station during the recent HURRICANE.

2. Most of the damage on this station during Hurricane "Hazel" was roof damage. The following types were affected:

a. Built up roofing.

b. Shingle roofing.

c. Corrugated metal.

d. Copper Flashing on Hangars.

Other major damage to structures was the loss of a boat pier at Solomons Annex and the collapse of a recently constructed prefabricated unicon building at Webster Field. There are no apparent protective measures which could have prevented the damages incurred.

T. B. NEBLETT

Enclosure (2) to Letter PRNC to WD 22 March 1956
Page 1 of 1 Appendix III

NP/A25(140
0070-400
13 January 1955

From: Public Works Officer, U. S. Naval Gun Factory
To: District Public Works Officer, Potomac River Naval Command

Subj: Disaster control measures

Ref: (a) DPWO Notice 11155 of 17 Dec 1954

1. Reference (a) requests addressees to provide experience data on physical measures that have proved effective in curtailing or reducing damage to the various naval installations caused by natural-type disasters.

2. During the tenure of this officer two disasters have occurred in the Washington area in which the Naval Gun Factory has been concerned. As it is assumed that first-hand information is required, the following comments will be limited to those two disasters.

3. The first of these was the accident at Union Station, caused by brake failure on a main line locomotive and resulting in extensive damage to the concourse from the locomotive and train traveling across and eventually sinking through a floor designed for approximately 100 lb. per sq. ft. This officer visited and observed the work of the terminal company employees in restoring service. The following was observed:

a. Immediately after the accident the chief engineer of the terminal company organized a design section to redesign the floor for temporary repairs and arranged for labor from the Pennsylvania Railroad at Baltimore to undertake the repairs. This action was effective in expediting the work of reconstruction.

b. The chief engineer "broadcast" a call to all activities for equipment; and, as a result, many items of equipment, such as mobile cranes (too large for use), arrived and interfered with the delivery of heavy timber.

c. No system of security passes was available; as a result, there were approximately 3,000 curiosity-seekers interfering with the workmen while at least two groups of workmen supplied by local contractors were unable to enter, being stopped by the police. Later a system of passes was initiated and the police then were able to determine who should be admitted to the premises.

4. The second disaster was Hurricane "Hazel". Action taken by the Naval Gun Factory was based on previously prepared Hurricane and Flood Control bills. These were found to work well, with only minor modifications being necessary. Sandbagging of building openings was accomplished according to a rather elaborate plan which set forth the number and distribution of

sandbags for any given flood level. Approximately 5,000 bags were filled, using a four-nozzle sandbag filler developed at this activity some twelve months previously. Data on the speed of sandbag filling were available from tests, so that it was possible to determine the number of personnel required to complete the operation by the time of the expected flood crest.

R. B. MORRIS

Suggestions for Emergency and Permanent Protection Works

1. The control of erosion of the banks of the entire perimeter area of the Naval Air Station, Patuxent River, has increased to a project of major magnitude. Both temporary and long range measures are proposed and action has been initiated on both programs. It is believed that the proposed action is pertinent to the solution of similar problems at both private and public installations in the area being studied by the Corps of Engineers.

2. Appendix I shows photographs of damage to beach perimeter, Naval Air Station, Patuxent River.

3. Appendix II is a report of a plan to obtain a long range program for correction of deficiencies and repair erosion of the shore line at the Naval Air Station, Patuxent River, through a joint study to be conducted by the Beach Erosion Board, Corps of Engineers, U. S. Army; District Public Works Office, PRNC; and the Naval Air Station (Public Works Department) Patuxent River. This study has been undertaken. Modifications were later made in the funding arrangements and in the distribution of the field work.

4. Action planned to be taken as an immediate measure pending completion of the long range program but subject to approval and funding by higher authority, is shown by Appendix III.

5. Appendix IV shows a schematic of a revised bulkhead design as considered desirable by BuDocks (see Y&D Dwg. No. 718038). The revised bulkhead (first and second increment) is estimated to cost $662,000.

Technical Assistance to Potomac River Naval Command
on Erosion Problem at Naval Air Station
Patuxent River, Maryland

1. Statement of the Problem - The Naval Air Station at Patuxent River, Maryland is located on the south shore of the Patuxent River at its entrance into the Chesapeake Bay. This is a permanent Naval Station with extensive improvements and developments. The problem consists of continuous recession of the shore line at various locations on both the Bay and River frontage with accompanying erosion and slumping of the bluffs backing the narrow sand beaches. The only shore line structures pertinent to the study area are three seaplane basins. The basins are protected by concrete sheet pile breakwaters and bulkheading. One basin is located on the Bay shore and two are located on the River shore. The present shoreline condition indicates no immediate hazard to existing buildings and harbor installations from normal wave action, however, severe storm wave action could create considerable damage to existing buildings (residential quarters) located along the Bay shore line. The public works force at the Station has constructed bulkhead and riprap protection at some of the more critical locations, with varying degrees of success in reducing the erosion. The Public Works Officer of the Patuxent Naval Air Station desires a comprehensive study with a view of formulating a long range plan for improving and preventing further erosion of the entire River and Bay shore line of the Station.

2. Location Map - A map showing the location and limits of the survey and study areas is attached hereto.

3. Work Program -

Work Items	Estimated Cost
a. By the Beach Erosion Board	
(1) Compile data on littoral forces, shore line and offshore depth changes	$ 650.00
(2) Establish base line and benchmarks for control of topography and hydrography	1,400.00
(3) Obtain offshore profiles to 30-foot depth with sufficient back shore topography; spacing of profiles in accord with shore line orientation and existing structures	1,300.00
(4) Procurement and analysis of beach and bottom samples	500.00
(5) Analysis of borings to be furnished for possible sources of beach fill material	150.00
(6) Study of existing beach structure, including significant dimensions, history, conditions and effectiveness	125.00
(7) Preparation of report including analysis of data, development of plan of protection with estimated cost	1,000.00
	$5,125.00
Overhead on personnel services	950.00
Total estimated cost	$6,075.00

Enclosure (3) to Letter FRNC to WD 22 March 1956
Page 1 of 2 Appendix II

b. By Public Works Officer, Potomac River Naval Command

(1) Furnish prints of aerial photographs flown in 1938, 1952, and 1954

(2) Furnish copy of 1944 survey sheets of shore line made by Navy

(3) Furnish borings for determination of possible source of beach fill material

(4) Furnish ground photographs if requested

4. Completion Time - It is estimated that with proper coordination with the District Public Works Officer of the Potomac River Naval Command and the Public Works Officer of the Patuxent Naval Air Station the work program as outlined in paragraph 3 could be completed five months after initiation of field work. If work items 3 a (2), (3) and (4) can be accomplished by the Naval Command, the report can be completed 45 days after receipt of data.

H1/L1-2
08-1209

22 September 1955

From: Commanding Officer
To: Chief, Bureau of Aeronautics
Via: (1) Commander, Naval Air Test Center
(2) Chief, Bureau of Yards and Docks

Subj: Beach Erosion along Chesapeake Bay Coastline of the Naval Air Station, Patuxent River, Maryland; request project for immediate rectification of

Ref: (a) BUDOCKS Instruction 11015.7 of 29 Jul 1955 Subj: Control of Property caused by Erosion
(b) Engineering Service Request No. 10-54 from CO NAS to DPWO PRNC
(c) DPWO PRNC ltr to CO NAS N1(3) DB-300 RAF:fs of 18 Jan 1955
(d) DPWO PRNC ltr to Chief of Engineers, U.S.Army Beach Erosion Board N1(1) DB-350 AFL:se of 10 March 1955
(e) Corps of Engineers, Beach Erosion Board ltr to DPWO PRNC of 23 Feb 1955
(f) DPWO PRNC ltr to CO NAS N1(1) DB-350 AFL:se of 10 Mar 1955
(g) DPWO PRNC ltr to Corps of Engineers, Beach Erosion Board NA/2/N1-1(14) DB-350 AFL:fs of 1 Aug 1955

Encl: (1) Public Works Dwg. No. C-3227 titled Proposed Bulkhead (not included)(see Appendix I)
(2) Photographs of Beach Area along Chesapeake Bay

1. Reference (a), the subject of which is control of property damage caused by erosion, points out that the cost incurred to correct damaging effects of erosion action invariably exceeds by far the initial cost that would have been incurred by effecting appropriate methods for erosion control. Although reference (a) deals primarily with the application of erosion control to projects that have already been approved, the basic principle of taking preventive action to preclude far more costly replacement is applicable to the situation existing at this station.

2. The seriousness of this situation resulted in the origination of reference (b) soon after hurricane "Hazel" in 1954. The detail of work of reference (b) is quoted as follows:

"The coastline of this station has been gradually eroding away. The recent hurricane "Hazel" has magnified the erosion damage to such an extent that immediate corrective action is required. The District Public Works Officer is requested to inspect the coastline at this station and recommend corrective measures to halt the erosion. It is requested that this project be classified as URGENT." Subsequent to the origination of reference(b) the normal wave and tide action, plus the effects of hurricanes "Connie" and "Diane" in August 1955, has greatly increased the erosion problem. The photographs, enclosure (2), have been taken subsequent to hurricanes "Connie" and "Diane" and vividly portray the seriousness of the problem and the necessity for taking of immediate remedial action.

3. Reference (c) advised that an engineering study on the subject problem would be made in collaboration with the Beach Erosion Board of the U. S. Army, Corps of Engineers.

4. References (d) and (e) constitute correspondence between the District Public Works Officer and the Corps of Engineers, Beach Erosion Board, relative to the scope of the study and transfer of funds to cover same. It is noted from reference (e) that the Beach Erosion Board staff is equipped to make field surveys on problems of this character and the primary mission is to carry out the Board's research program with the result that any other field tasks must therefore be undertaken as a spare time activity which makes scheduling somewhat uncertain.

5. Reference (f) advised that the Chief of the Bureau of Yards and Docks had suggested that problems of this nature could best be handled by the Beach Erosion Board of the Corps of Engineers and had authorized the use of advance planning funds for the accomplishment of this work. By copy of reference (g) this command was advised that the hydrographic survey was scheduled to start on 15 August 1955. The survey party, under Mr. R. L. Harris, commenced work on 15 August 1955 and upon completion departed on 6 September 1955. The members of this group were very cooperative and their working relationship with personnel of this command were of the highest order. It is understood that their data consisting of soundings and sand samples have been transmitted to the Board.

6. This command concurs that for long-range planning and study, the Beach Erosion Board of the Corps of Engineers is of great value and the most logical method of arriving at the long-range permanent solution to beach erosion problems. The problem existent at this station, however, has reached such serious proportions that it is considered that immediate steps are essential to preclude not only loss of valuable land but structures and facilities. As will be noted from enclosure (2), quarters fronting on the Chesapeake Bay are in danger of being lost as well as the Perimeter Road and bridge in the Goose Creek area. Enclosure (1) with estimates has been prepared. It is considered that this type of bulkheading will prevent further erosion for a minimum of ten years, yet in no way would interfere with the long-range recommendation of the Erosion Control Board which it is considered probably will consist of jetties extending out into the Bay. It is further considered that the long-range recommendation of the Beach Erosion Board will require a considerable appropriation involving budgeting in not earlier than the Fiscal Year 1958 Budget.

7. As indicated in enclosure (1), the proposed bulkheading has been divided into two increments. The first increment being to a relatively small extent more important than the second increment in view of the structures involved. Increment No. 1 is estimated to cost $122,356.00 and Increment No. 2 $130,070.00. It is considered necessary to construct both Increments No. 1 and 2 within the next ten months and prior to the calendar year 1956 hurricane season. The project has been divided into two increments, therefore, based upon the possibility that funds for the entire project can not be obtained within the relatively near future.

8. It is requested that every effort be made to fund this project to the maximum possible extent from funds currently available to the Department of Defense.

U. S. NAVAL HOSPITAL
QUANTICO, VIRGINIA

Do not address the signer of this letter but address your reply to
COMMANDING OFFICER
U. S. NAVAL HOSPITAL
QUANTICO, VIRGINIA
and refer to No.
NH28-13-c
A1-2
6 FEB 1956

From: Commanding Officer, U. S. Naval Hospital, Quantico, Va.
To: District Engineer, Corps of Engineers, U.S. Army,
First and Douglas Streets, N.W., Washington 25, D. C.

Subj: Hurricane Study along Potomac River in Virginia

Ref: (a) Corps of Engineers, Public Notice 501 of 12 JAN 1956

1. The following report concerning the character and amount in dollars of damage inflicted by hurricane "Diane" in 1955, is furnished for your information as requested in reference (a):

(a) Roof slates were loosened and carried away by high winds and rain resulting in leaks in roofs of buildings #2200, 2202 and 2203. Delayed repairs will result in further leaking and interior damage.

(b) The hurricane caused erosion damage behind the seawall at the rear of 1200 block staff quarters by wave action over the wall and wash action through weep holes and construction joints in the wall.

2. A specific work request was submitted to Bureau of Medicine and Surgery 3 October 1955 to obtain the funds necessary to correct damage incurred. Requested funds totalled $3,860.00.

/s/ M. R. Wirthlin
M. R. WIRTHLIN

N1
84-136

FEB 1 1956

From: Commanding Officer
To: District Public Works Officer, Potomac River Naval Command

Subj: Shore Erosion Control, NAS, Patuxent River, Md.

Ref: (a) CO NAS ltr N1 ser 84-89 of 24 Jan 1956
(b) Telcon between Mr. Leder, DPWO, HRNC and Mr. Coleman of 27 Jan 1956

Encl: (1) Wind Data at NAS, Patuxent River, Md.

1. By reference (b), the scope of the wind data furnished under reference (a), was extended to include the data on winds of hurricane velocity.

2. Enclosure (1) covers the requested wind data and in addition covers wind above 30 knots for the past five years.

T. B. NEBLETT

P. J. SIMMONS
By direction

(Submitted at Public Hearing Colonial Beach, Virginia 8 February 1956)

PATUXENT RIVER SURFACE WINDS - SUSTAINED VELOCITY
30 KNOTS OR GREATER

DATE	DIR	VELOCITY	FROM	TO
20 FEB 1950	NW	30 G50	20/0430	20/1130
23 FEB 1950	NW	30 G50	23/0830	23/1430
2 MAR 1950	WNW	28 G45	2/0930	2/2030
20 NOV 1950	NW	32 G45	20/2030	20/0000
21 NOV 1950	NW	30 G40	21/0000	21/0130
25 NOV 1950	ESE	32 G45	25/0030	25/0630
4 DEC 1950	NW	30 G38	4/1530	4/2330
16 JAN 1951	NW	28 G40	16/1030	16/1630
2 FEB 1951	NNW	30 G40	2/0130	2/0730
7 FEB 1951	NW	30 G50	7/1630	7/2330
22 FEB 1951	NNW	28 G40	22/0230	22/1430
20 MAR 1951	NW	28 G40	20/0230	20/0930
22 MAR 1951	NW	28 G40	22/0130	22/0730
7 NOV 1951	SE	27 G40	7/0100	7/0500
15 DEC 1951	NW	30 G40	15/0800	15/1500
20 DEC 1951	SSE	28 G40	20/2000	20/2400
10 JAN 1952	NW	30 G38	10/2000	10/2400
18 FEB 1952	NW	28 G40	18/0000	18/1000
11 MAR 1952	SSE	30 G35	11/0300	11/0500
16 MAR 1952	WNW	30	16/1300	16/2000
19 MAR 1952	SE	32 G40	19/0500	19/0900
21 NOV 1952	ESE	34 G50	21/0900	21/1300

Enclosure (1) to Letter Patuxent NAS to PRNC 1 Feb 1956
Page 1 of 3

PATUXENT RIVER SURFACE WINDS - SUSTAINED VELOCITY - 30 KNOTS OR GREATER (continued)

DATE	DIR	VELOCITY	FROM	TO
26 MAR 1953	WNW	30 G37	26/0100	26/1600
2 NOV 1953	NW	34 G40	2/0000	2/0500
11 FEB 1954	NW	33	11/2200	12/0430
15 MAR 1954	NW	25 G42	15/1828	15/2328
11 SEP 1954	NW	30	11/0730	11/1430
11 FEB 1955	NW	31 G45	11/1600	11/2130
8 JUN 1955	E	30 G46	8/0830	8/1230
17 AUG 1955	SE	30 G42	17/2130	17/2400
18 AUG 1955	SE	32 G42	18/0000	18/0230

U.S. NAVAL AIR STATION
PATUXENT RIVER, MARYLAND

SUSTAINED SURFACE WIND VELOCITIES OF 30 KNOTS
OR GREATER IN HURRICANES HAZEL AND CONNIE

HURRICANE HAZEL

DATE 15 OCT 1954

WIND DIRECTION	VELOCITY	FROM	TO
ESE	35 G50	15/1000	15/1230
ESE	45 G58	15/1230	15/1500
SE	56 G70	15/1500	15/1628
SE	66 G78	15/1628	15/1700
SW	30 G50	15/1700	15/1800
WSW	50 G60	15/1800	15/1900

HURRICANE CONNIE

DATE 13 AUG 1955

ENE	33 G48	13/0000	13/0230
ESE	45 G69	13/0230	13/0430

Enclosure (1) to Letter Patuxent NAS to PNRC 1 Feb 1956
Page 3 of 3

U. S. NAVAL PROVING GROUND
DAHLGREN, VA.

In reply refer to

CA:DRM:bb
H4

From: Commander, Naval Proving Ground
To: Corps of Engineers, U. S. Army
Office of the District Engineer
Washington District, Washington, D.C.
Attn: Mr. R. L. Wadsworth

16 February 1956

U. S. Weather Bureau
Washington National Airport (3rd Floor)
Washington, D.C.
Attn: Mr. R. A. Hoover

Subj: Hurricane Data, forwarding of

Ref: (a) District, Corps of Engineers Public Notice 501 of 12 January 1956

Encl: (1) Tide and Wind Data on Hurricane Hazel, 1954
(2) Tide and Wind Data on Hurricane Connie, 1955
(3) Tide and Wind Data on Hurricane Diane, 1955
(4) Tide and Wind Data on Hurricane Ione, 1955

1. During the public hearing conducted at Colonial Beach on 8 February 1956, pursuant to reference (a), it was indicated that hourly wind and tide data taken during the hours preceding and following a hurricane might be of value to you.

2. Enclosures (1) through (4) are submitted for your information and possible use. The wind data was taken from records of our aerological office. Tidal readings came from records on our local tide gauge.

J. F. BYRNE

/s/ R. D. Risser
By direction

CA:DRM:bb
H4

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

HURRICANE "HAZEL" - 15 OCTOBER 1954

Time (E.S.T.)	Tide Gauge Reading (Ft.)	Average Wind Velocity (Kts.)	Average Wind Direction	Peak Gust in Preceding Hour (Kts.)
0700		10	ENE	
0800	+ .8	16	E	
0900	+ 1.3	22	E	32
1000	+ 1.6	26	E	42
1100	+ 2.4	28	E	45
1200	+ 3.6	26	ESE	40
1300	+ 4.3	29	ESE	50
1400	+ 5.0	30	ESE	48
1500	+ 5.5	31	ESE	52
1600	+ 6.0 *	33	ESE	66
1700	+ 6.1	28	SE	41
1800	+ 5.8	19	S	71 **
1900	+ 4.8	16	SW	33
200	+ 4.3			

* Maximum tide gauge reading of 6.2 ft. noted at about 1630. Normal high tide is about 2 ft. above mean low water level.

** Although average wind direction was SE to S in the period 1700-1800, one gust of 71 Kts. from the west was recorded at 1705 E.S.T.

Enclosure (1) to Letter U. S. Naval Proving Ground
to WD 16 Feb 1956

CA:DRM:bb
H4

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

HURRICANE "CONNIE" - 12 - 13 AUGUST 1955

Time (E.S.T.)	Tide Gauge Reading (Ft.)	Average Wind Velocity (Kts.)	Average Wind Direction	Peak Gust in Preceding Hour (Kts.)
0800	+ 2.3	9	NE	16
0900	+ 2.5	9	NE	18
1000	+ 2.4	10	NE	22
1100	+ 2.2	12	NNE	23
1200	+ 1.8	14	NNE	25
1300	+ 2.0	16	NNE	33
1400	+ 2.25	19	NNE	36
1500	+ 2.4	19	NNE	37
1600	+ 2.7	19	NNE	41
1700	+ 3.1	18	NNE	32
1800	+ 3.25	18	NNE	35
1900	+ 3.4	17	N	30
2000	+ 4.4	19	N	35
2100	+ 4.6	16	N	29
2200	+ 4.6	15	N	23
2300	+ 4.1	14	NE	25
2400	+ 3.9	12	NNE	21
13 August 0100	+ 3.8	14	NNE	26
0200	+ 3.7	12	NNE	22
0300	+ 3.9	13	N	23
0400	+ 4.3	14	NNW	26
0500	+ 4.6	16	NW	23
0600	+ 4.0	14	W	22
0700	+ 3.4	10	WSW	21
0800	+ 3.0	12	SW	21
0900	+ 2.7	13	SW	26
1000	+ 2.7	13	SSW	22
1100	+ 2.7	13	SSW	22

Estimated that storm center passed about 30 miles to east of U. S. Naval Proving Ground at 0500, 13 August.

Enclosure (2) to Letter U. S. Naval Proving Ground
to WD 16 Feb 1956

CA:DRM:bb
H4

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

HURRICANE "DIANE" - 17 - 18 AUGUST 1955

Time (E.S.T.)		Tide Gauge Reading (Ft.)	Average Wind Velocity (Kts.)	Average Wind Direction	Peak Gust in Preceding Hour (Kts.)
17 August	1200	+ 3.0	13	ENE	23
	1300	+ 3.25	14	ENE	22
	1400	+ 3.5	16	ENE	25
	1500	+ 3.7	19	ENE	28
	1600	+ 3.5	17	ENE	27
	1700	+ 3.5	19	ENE	29
	1800	+ 3.1	23	E	32
	1900	+ 3.0	22	E	33
	2000	+ 3.0	21	E	32
	2100	+ 3.1	20	ESE	31
	2200	+ 3.25	18	ESE	28
	2300	+ 3.6	17	ESE	26
	2400	+ 4.25	18	ESE	31
18 August	0100	+ 4.6	18	ESE	29
	0200	+ 4.7	19	ESE	31
	0300	+ 4.6	19	SE	33
	0400	+ 4.4	17	SE	26
	0500	+ 4.0	17	SE	27
	0600	+ 3.5	15	SE	29
	0700	+ 3.5	20	SSE	32
	0800	+ 2.6	17	SSE	31
	0900	+ 2.3	16	SSE	25
	1000	+ 2.3	16	S	28
	1100	+ 2.3	16	S	28
	1200	+ 2.8	15	SSW	25

Storm center passed to west of U. S. Naval Proving Ground.

Enclosure (3) to Letter U. S. Naval Proving Ground
to WD 16 Feb 1956

CA:DRM:bb
H4

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

HURRICANE "IONE" - 19 - 20 SEPTEMBER 1955

Time (E.S.T.)	Tide Gauge Reading (Ft.)	Average Wind Velocity (Kts.)	Average Wind Direction	Peak Gust in Preceding Hour (Kts.)
19 Sept 1100	+ .9	11	N	20
1200	+ 1.25	15	NNE	23
1300	+ 1.8	12	NNE	21
1400	+ 2.25	12	NNE	21
1500	+ 2.7	11	NNE	21
1600	+ 2.8	12	NNE	22
1700	+ 2.9	12	NNE	18
1800	+ 2.9	12	NNE	21
1900	+ 2.8	10	NNE	19
2000	+ 2.3	12	N	20
2100	+ 2.1	11	NNE	15
2200	+ 1.8	9	NNE	17
2300	+ 1.8	9	N	17
2400	+ 1.9	12	N	19
20 Sept 0100	+ 2.25	12	N	24
0200	+ 2.5	15	N	22
0300	+ 2.9	14	N	22
0400	+ 2.9	14	NNW	20
0500	+ 2.7	15	NNW	21
0600	+ 2.4	16	NNW	18

Enclosure (4) to Letter U. S. Naval Proving Ground
to WD 16 Feb 1956

HURRICANE SURVEY

CHESAPEAKE BAY, POTOMAC AND RAPPAHANNOCK RIVERS

APPRAISAL REPORT

JUNE 1956

APPENDIX C

Letters from Local Interests

CONTENTS

COLONIAL YACHT CLUB
"Safe Year Round Harbor"
Phone CApitol 4-2371
Colonial Beach, Virginia

MARTIN LUNSFORD
Manager

EFFECTS OF HURRICANES TO WATER PROPERTY IN COLONIAL BEACH

The hurricanes of recent years have caused many thousands of dollars in damage to boats in the harbor at Colonial Beach, Va. During hurricane Hazel Colonial Beach had approximately twenty boats either damaged, sunk or completely destroyed; valued at approximately one quarter of a million dollars. Colonial Beach is still suffering from the results of shoal water in the channel and in the anchorages. There is a great need for jetties and bulk-heads for considerable distances along the Potomac River side of the beach, particularly along the bathing beaches and around the point that protects the main anchorage basin. During hurricane Hazel there was approximately four feet of water completely covering the point, rendering the basin ineffective as a harbor in protecting the many boats. There are approximately 45000 arrivals and departures of boats in and out of Monroe Bay annually; with a roughly 60% of these being commercial craft. Many of the deeper draft boats experiencing difficulty getting through. The harbor at Colonial Beach is most important as an anchorage due to its strategic location. It is the only sheltered harbor for a distance of 25 miles along the west bank of the Potomac River. The harbor in Monroe Bay is very important to the Sea Food Industry as we had as many as 200 commercial boats going in and out of the harbor daily at the peak of the oyster season.

Beach Erosion is causing a very serious threat to the livelihood of many citizens of this community. The storms of the past few years have been washing away property of both home owners and business establishments. Some individuals have been erecting jetties and bulk heads without much success.

A large project is needed which will cover all of the effected areas.

/s/ Martin Lunsford

Colonial Beach, Va.
8 February 1956

Gentlemen:

Reference recent notices in newspapers announcing a public hearing in connection with the effect of hurricanes and protection against them, the following is submitted as information:

"The undersigned owns a home, occupying four lots directly on the riverfront, on the SE corner of 8th Street and N. Beach Avenue, Colonial Beach, Virginia;

"This property is separated from the Potomac only by the Avenue and a strip of land, ranging from six to eight feet, and then sloping downwards for a distance of perhaps ten feet, and extending for perhaps twenty additional feet, to the high water mark of the Potomac;

"Nine years ago, when the property was purchased, the strip of land referred to extended several feet further, and the slope to the river was gradual; today, due to the effect of tide elevations, wave heights, etc., resulting directly from hurricanes, the slope has become a drop; several trees have been undermined and have toppled onto the narrow strip of beach; cement steps ($150.00) and weighing perhaps 5,000 lbs demolished; a small boat ($150.00) secured about eight feet above normal river level demolished; security of large trees and resultant major damage to hard surface avenue endangered;

"All land beyond this side of the Avenue is public property, and the undersigned is of the opinion that security measures cannot be accomplished by local authorities without Federal assistance".

Respectfully submitted,

/s/ Donald McKinney
DONALD McKINNEY
Major, HUSAR

February 8, 1956

Corps of Engineers, U. S. Army
Office of The District Engineer
Washington District
First and Douglas Streets, N. W.
Washington 25, D. C.

Re: Hurricane Study
800.92 NAWGW
Public Notice 501

Gentlemen:

At a tremendous expense, I have taken steps to protect my waterfront from the ravages of the sea and hurricane. My efforts will be of no avail unless the public property adjoining my property is protected.

I will appreciate your earliest consideration of the public property in the vicinity of Colonial Beach being protected by jetties, or as the Engineers may deem necessary.

Very truly yours,

/s/ W. D. Williams
W. D. Williams,
Attorney for H. E. Geissinger, Jr.
New Atlanta Hotel,
Colonial Beach, Va.

WDW:b

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS
Richmond 19, Va.
February 3, 1956

Hurricane Problem along the
Tidewater Reach of the Potomac
River in Virginia

District Engineer
U. S. Army, Corps of Engineers
Norfolk, Virginia

Dear Sir:

Attached for your consideration is a list showing the location and cost of damages from tide and wave action experienced by the Virginia Department of Highways to its road system during the last three years. The cost figures shown on the list include repairs to bridges, ferries, ferry slips and certain rip-rap. We have not taken into consideration the cost of any jetties, breakwaters, or structures of such nature which are beyond the jurisdiction of this organization.

The highways of the Commonwealth of Virginia have suffered serious damage from hurricanes and storms particularly during the years 1954 and 1955. The greater portion of this damage, however, was caused by flooding which was a direct result of rainfall and wind.

There are many vulnerable locations where damage from wave and wind action may be expected.

Sincerely yours,

/s/ S. V. Munsey
S. V. Munsey
Maintenance Engineer

1954 - Potomac River

Northumberland County	Sunny Bank Rt. 644. Damage to Ferry, Slip, and Approaches	$ 4,500
Westmoreland County	Colonial Beach, Rt. 1101. Damage to shore line next to road. Bank washed very badly. Need $90,000 to protect bank all the way through.	25,000

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS
Richmond 19, Va.
February 9, 1956

Hurricane Problem along the Chesapeake Bay from Smith Point to Wolf Trap Light, Including the Tidal Reaches of the Rappahannock River and other Tributaries

Corps of Engineers, U. S. Army
Office of the District Engineer
First and Douglas Streets, N. W.
Washington 25, D. C.

Gentlemen:

Attached for your consideration is a list showing the location and cost of damages from tide and wave action experienced by the Virginia Department of Highways to its road system during the last three years. The cost figures shown on the list include repairs to bridges, ferries, ferry slips and certain rip-rap. We have not taken into consideration the cost of any jetties, breakwaters, or structures of such nature which are beyond the jurisdiction of this organization.

The highways of the Commonwealth of Virginia have suffered serious damage from hurricanes and storms particularly during the years 1954 and 1955. The greater portion of this damage, however, was caused by flooding which was a direct result of rainfall and wind.

There are many vulnerable locations where damage from wave and wind action may be expected.

Sincerely yours,

/s/ S. V. Munsey
S. V. Munsey, Maintenance Engineer

SVM/T

1954 - Rappahannock River

Lancaster County	Route 604, Merry Point Ferry. Damage to Ferry, Slip and Road	$ 4,500
	Route 621 to Morattico. Damage to road from wave action	2,000
Richmond County	Route 634, Damage to road and bank by wave action	2,000
	Route 634, Cat Point Creek Bridge	20,000
	Route 638, Public Landing	2,000
Mathews County	Gwynn's Island	8,000
Richmond and Essex Counties	Route 360, Rip-rap at Rappahannock River Bridge (Tappahannock)	1,800

1955 - Rappahannock River

Mathews County	Rip-rap on Route 223 (Gwynn's Island Repairs to be made in 1956)	11,000

Route 2, Box 160-A
Richmond, Virginia
January 30, 1956

U. S. Army Corps of Engineers
Washington District Office
Washington, D. C.

Gentlemen:

I have read with interest the article that appeared in the January 24, issue of the RICHMOND NEWS LEADER announcing a meeting to be held on February 9, at 1:30 P.M., in Saluda, Virginia, for the interest of all concerned regarding the help and need to property owners in that area who have been affected severely during the past several years by hurricanes and wind storms. It is my understanding that Congress has appropriated funds to help property owners with damages due to high water and high winds that have caused considerable damage to most all property owners in the Deltaville, Virginia, area.

I am the owner of a cottage located below Deltaville, Virginia, at the entrance of Jackson's Creek and the Chesapeake Bay, with an approximate 100-ft. facing on the water. Fifty (50) feet of this is directly in front of the lot I own and approximately fifty (50) feet is on the side of the lot. This property was purchased in 1944, and I have spent approximately $300. annually in an effort to protect my property fronting on the water; however, during that time, I have lost around fifteen (15) feet of frontage and each year it seems that the storms are more severe and the damage becomes greater.

There is a solution, I am sure, to this constant erosion caused by high water, and I am sure all property owners in my area would be very much interested to know what help the Federal Government can give in trying to help solve this problem. There are four (4) cottages, including my own, located in this general area that are facing the water. There are other cottages located in back of us which are not affected by high water.

I will try to make an effort to attend the meeting scheduled on February 9, in Saluda, Virginia; however, if it is not possible for me to attend this session, please place this letter with the appropriate person so that proper action can be taken.

Yours very truly,

/s/ W. B. Osborne
W. B. Osborne

On Jackson's Creek

Mrs. F. W. Scott
Waveland
Deltaville, Virginia

Feb. 9th 1956

Secretary of the Army
Washington, D. C.

Dear Sir:

On the 15th of October 1954 Hurricane Hazel struck our place with full force about 2 p.m. It was four hours of absolute fury. Our Eastern front seemed directly in line with the Capes - nothing to break its velocity. It blew down 32 trees and shrubs and what weren't downed were badly damaged. Our house rocked like a ship, the gutters came down like cork screws.

The seawall of concrete was washed away, the banks badly washed and, in one place the inundation was 15 feet. The silt went over the top of our dwelling and even over the top of tall pines on our lot - they are just taking on their natural color again. Before the storm blew out the wind shifted to south west - so our entire water front was stricken.

We restored dikes and jetties and filled in with dirt - then in 1955 Hurricanes Connie and Dianne came and washed away half of that dirt - blew down more trees and took 3/4 of our wharf.

I wish very much the Chief engineers could or would come and look the situation over and make any suggestions that might be helpful in safeguarding our property from these terrible storms.

We are now working on damage done to our dwelling, which is considerable, from said storms.

Respectfully submitted by

/s/ Mrs. Bessie Gwathmey Scott
(Mrs. Frank W.)

In care of
Mr. Willie Blake Harron,
Deltaville
Virginia

To the Chief of Engineers
U. S. Army Engineers

We the people of lower Middlesex County, request that your office give consideration to the protection of the mouth of Jackson's Creek. This waterway has been very badly damaged by recent hurricanes to the extent that the draft has been reduced to such extent that the mouth of said creek is almost filled by the shifting sands from Stingray Point moving up shore. A stone jetty on the east of Jackson's Creek from shore to entrance of creek and west of entrance to Stove Point Shore. This would insure needed protection that would last forever, and make Jackson's Creek one of the best harbors on the bay.

(Signed by 100 persons)

BULLINGTON PAINT CO., Inc.

Distributors of
PAINTS AND WALLPAPER

Fourth and Broad Streets
Richmond, Virginia
Feb. 3, 1956

U. S. Army Corps of Engineers
Washington District Office
Washington, D. C.

Gentlemen:-

I have read the article that appeared in the Jan. 24th issue of the Richmond News Leader announcing a meeting to be held on Feb. 9, at 1:30 P. M., in Saluda, Va. for the interest of all concerned regarding the help and need to property owners in that area who have been affected severely during the past several years by hurricanes and wind storms.

I own a cottage located below Deltaville, Virginia, above the entrance of Jackson's Creek and the Chesapeake Bay, with 269-ft. facing on Chesapeake Bay. This property was purchased approximately 17-years ago, and I have spent approximately $350.00 annually in an effort to protect my property fronting on the water; however, during that time, I have lost around 15 to 20 feet of frontage.

As a suggestion, from my experience during the time I have been down there stones and broken concrete seem to hold better than anything else. If it would be possible to put stone jetties out in the water I think they would help more than anything else.

If possible, I will be at the meeting in Saluda on Feb. 9, at 1:30 P. M. I do hope we can get some real help from you.

Very truly yours,

/s/ Harry S. Goode
Harry S. Goode

HSG/f

Richmond, Va.
#9 Willway Ave.
January 25/56

U. S. Army Corps of Engineers
Saluda, Virginia

Re: Soil Erosion
Meeting Feb.9/56

Gentlemen:-

In anticipation of your hearing to be held on February 9th, 1956, 1:30 P.M. at the Court House in Saluda Middlesex County Virginia.

We are owners of 150 foot frontage on the Chesapeake Bay, Stingray Point, Middlesex County since 1937. In that period of time we have lost the total frontage of 150 feet to a depth of 70 feet (5 feet high) due to excessive rough tides ranging from 4 feet to 6 feet in height, with wind velocities reaching from gale to hurricane force, destroying trees, property and the most important is the loss of Virginia's precious soil.

We have in past years spent thousands of dollars in creosote bulk-heads and jetties, and the situation as we see it is far beyond the individual to cope with.

We trust that sufficient information will be obtained from this meeting so that you may be able to recommend some relief.

Yours very truly,

/s/ Maude A. Fleming

/s/ Thurman Fleming

Mr. & Mrs. Thurman Fleming

1401 Wilmington Avenue
Richmond 22, Virginia

February 2 - 1956

United States Army Corps of Engineers
Washington, D. C.

Gentlemen:

Writing with reference to article published in Richmond News Leader, January 24, 1956, I wish to state that I own 200 feet of water front property on Chesapeake Bay in Middlesex County between Deltaville and Stingray Point.

Our cottage was built in 1937 and is used as a summer home. Since purchasing same we have lost at least 75 feet, or more, of land due to high tides -- a considerable amount of this loss was due to hurricanes Hazel and Connie and Diane.

During my husband's lifetime we made an effort to keep up breakwaters and jetties, which had to be replaced every few years at the cost of a large sum of money. Now I am trying to protect the water front and prevent as much erosion as possible by using stone, or large broken up pieces of cement.

We have spent several thousand dollars trying to protect our property. Waves would be as high as 8 or 10 feet, and last year, for instance, tides were so high that water stood on the property for days -- the cottage being completely surrounded by water and water standing out in the road, which is probably 20 feet behind the cottage at the back entrance.

I am not in a position to know wind velocity at that time. However, during Hurricane Hazel the roof of the cottage was lifted up (or bulged) to the extent that it cost several hundred dollars to have that repaired.

Any assistance that I can be given will certainly be appreciated and I do hope that something can be done to protect property owners in this vicinity.

Thanking you for your kind consideration of the above, I am

Yours very truly,

/s/ Mrs. Philip Keppler

Copy sent to Saluda for
the meeting to be held there
on February 9th.

CHAS. I. WALKE
405 W. 32nd St.
Richmond, Va.

405 West 32nd Street
Richmond, Virginia

February 6, 1956

U. S. Army Corps of Engineers
Washington District Office
Washington, D. C.

Gentlemen:

I note an article in the Richmond News Leader of January 24, 1956 regarding hearings by the U. S. Army Corps of Engineers to be held at Saluda, Virginia, February 9th in reference to damage done by hurricanes along Chesapeake Bay and Tidal Reaches of the Rappahannock and other rivers.

I own property at Stingray Point facing Stingray Point Light House. I have owned property down there for about twenty-two years, in which time I have lost four lots 50' x 150', and have moved my house back once. It now appears if something is not done in the near future that I may have to move again. In the last year I have spent about $800 for stone hauled from Richmond and placed against the bank, which helped some in the last hurricane. In past years I have had three breakwaters put in but they wash out as fast as you put them in.

I have no suggestions to offer as I have tried everything I know, however, it does seem to me that the Government could do something to protect the property along the Bay, as the points jutting out into the Bay in this area could be used by the Government to great advantage for defense. I am unable to give you any information as to the wind velocities, wave heights, etc. during the hurricanes, as I have not been on the Bay during any of the storms, but I do know that these points of land are being washed away year by year. Anything that the Government could do to stop this would certainly be an asset to them for defense in times of war.

Yours very truly,

/s/ Chas. I. Walke
Chas. I. Walke

CIW/MN

J. W. FERGUSON SEAFOOD COMPANY
Wholesale and Retail Dealers in
FISH, OYSTERS AND CRABS

Phones: Saluda 8-2426 - 8-2421

Remlik, Virginia
February 8, 1956

Corps of Engineers, U. S. Army
Office of the District Engineer
Washington District
First and Douglas Streets, N. W.
Washington 25, D. C.

Or

TO WHOM IT MAY CONCERN:

There has been extensive damage from hurricanes in the McCann's Bay or Butylo area of the Rappahannock River dating back to the Hurricane of August 23, 1933. At that time there were heavy losses from boats destroyed and complete loss of oyster house and docks. Damage was caused by extremely high water accompanyed by heavy seas with winds of approximately hurricane force from South East direction with winds that continued from 6 to 8 hours. During the period from 1932 until 1954 there was some damage by storms attributed to lesser hurricanes.

On October 15, 1954, Hurricane Hazel did extensive damage to boats and property destroying several boats completely and doing extensive damage to a score or more boats. These boats being commercial work boats varying in size from 30 to 45 feet. An oyster house employing 30 people and 900 feet of dock was also completely destroyed in Hurricane Hazel.

Shortly after this storm there was a new Oyster House built replacing the one that had been destroyed and a solid filled causeway extending from mainland to plant.

During the fall of 1955 the two hurricanes that did us most damage was Connie and Dianne, although there was some slight damage from Hurricane Ione. In all of these storms the damage has been from heavy seas accompanyed by strong winds blowing in a North East - East and South East direction. This area is exposed to a long stretch of the river without any protection.

J. W. FERGUSON SEAFOOD COMPANY
Wholesale and Retail Dealers in
FISH, OYSTERS AND CRABS

Phones: Saluda 8-2426 - 8-2421

Remlik, Virginia

The reason the losses have been continued in this area is because Butylo is in the center of the oyster producing area of the Rappahannock River. People working in this area do not have any where else to harbor their boats to protect them against storms and no other means of livelihood. For several years we have brought this fact to the attention of the Corps of Engineers.

Our suggestion as a damage preventive would be to place a permanent stone jetty to the east of this anchorage in a half moon shape high enough above water to knock the seas down that accompany these tropical hurricanes.

/s/ J. W. Ferguson

February 22, 1956

Corps of Engineers, U. S. Army,
Office of the District Engineer,
Washington District,
First and Douglas Streets, N. W.
Washington 25, D. C.

Dear Sirs:

In consonance with the tenor of the meeting held by representatives of your office in Saluda on Feb. 9, 1956, this letter outlines more than $100,000.00 worth of storm damage sustained by properties located on and in Queen's Creek, since August 24, 1954, the advent of Hurricane Diane. Practically all of the enumerated damage could have been obviated if the sand bar condition at the mouth of Queen's Creek had been corrected. It is urgently requested that temporary relief be given to this situation until a re-study and representation of the initial project can be made.

Specifically the damages suffered on and in Queen's Creek since August 24, 1954 are as follows:

HEAVY WAVE ACTION: Heavy wave action and high tides engendered by hurricanes have shifted bar sands to further close and obstruct the mouth of Queen's Creek much beyond the conditions existent before Hurricane Diane. The drastically reduced channel available only to highly restricted draft boats and only at favorable tides has caused damage in the following three ways:

First: Many thousand man days of fishing, oystering, and clamming have been lost since the hardy souls who still maintain their boats in Queen's Creek have but a limited time for operations outside the Creek. A partial survey by no means complete indicate a loss of an additional 3,000 man days of operation since August 24, 1954. As an evaluation of this damage into dollars, the fishermen still operating from the creek report a reduced earnings of some $30,000.00 over the last year and a half.

Second: Much damage to boats and equipment has been caused in an attempt to get in maximum work time and thereby getting caught on the bar and enduring the resulting pounding and strain, either until the next high tide, or until wrenched off the bar. This damage is hard to evaluate, but specific instances are on record in the amount of some $5,000.00 since August 24, 1954.

Third: Much added expense has been incurred since an additional substantial number of larger boats have been locked out of Queen's Creek as a working base due to bar deterioration since August 24, 1954. The "NAT" owned by Mr. Earl Hudgins and the "KERMAN KRINTZ" owned by Capt. Romie Hudgins are two examples. Beside the added expense of being denied Queen's Creek, the boats have suffered severe storm damage in lost gear, in lost tenders, and damage to boats themselves, since they were forced to use the totally inadequate harbor facilities of Milford Haven and Cobbs Creek. The estimated damage in dollars to the "NAT" was some $2,200.00 and to the "KERMAN KRINTZ" some $1,500.00. An estimate from other boat owners similarly locked out of Queen's Creek places this total damage at $10,000.00, at least.

OYSTER DAMAGE: Within Queen's Creek, since August 24, 1954, there has been an additional great damage to the Oyster Crop. The closing of the inlet and egress of water from the Creek by the closing of the channel through the bar has caused the oyster beds in Queen's Creek to be subject to the excess fresh water problem as noted in various Rappahannock projects. Further, the heavy rains have caused excess wash of silt over the oyster beds and coupled with restricted tidal action through the bar, the silt has remained on the beds and continued loss of oysters is being caused. A partial survey indicates that the Oyster Crop within Queen's Creek has been reduced by some 10,000 bushels since August 24, 1954 and that another loss of 5,000 bushels will be sustained before June, 1956. It is conservatively estimated that the nation's oyster supply has dwindled by some 15,000 bushels as a result of storm damage to Queen's Creek. This represents some $45,000.00 loss of income to the local community.

DOCK and BUILDING DAMAGE: Much actual damage was suffered in Queen's Creek since August 24, 1954 due to high water, made even higher by a blocked Creek entrance. Specific instances are the Dock and Oyster Shucking House of Mr. Wattie Mitchum - $2,000.00, Dock of Mr. W. P. Lewis, $300.00, Dock of Mr. C. F. Pinnell, $300.00, Dock of Mr. R. Blankenship - $300.00, etc. It is the considered opinion that little of the above damages would have been sustained if the proper tidal action was permitted through the bar at the mouth of Queen's Creek. This belief is based on the best recollections of the 1933 situation when even higher tides were recorded generally, but not in Queen's Creek. Total Dock and Building Damage due to high water since August 24, 1954, estimated at $10,000.00.

RECAPITULATION: By way of Recapitulation, the storm damage to Queen's Creek residents and property since August 24, 1954 is as follows:

HIGH WAVE ACTION	
Man Day Loss	$30,000.00
Damaged Equipment	5,000.00
Damage to Boats forced to other inadequate harbors	10,000.00
OYSTER CROP DAMAGE	45,000.00
DOCK & BUILDING DAMAGE	10,000.00
TOTAL	$100,000.00

RECOMMENDATION: In view of the terrific damage suffered by the Queen's Creek community due to storm damage since August 24, 1954, it is recommended that emergency funds be requested by the Corps of Engineers to give immediate temporary relief to this community by dredging the bar at the mouth of the Creek.

It is further recommended that the Corps of Engineers initiate an early reconsideration of the permanent project for the Improvement of Queen's Creek. The Queen's Creek Improvement Association is now re-studying all aspects of the data available and will forward this data to your office in the near future.

The Queen's Creek Improvement Association stands ready at any instant to further assist in the preparation of the Queen's Creek Project for presentation to the Congress of the United States.

Yours respectfully,

/s/ T. L. Brooks
T. L. Brooks, (Capt. U. S. M. M. ret'd.)
Pres., Queen's Creek Improvement Association

Copies to:

Senator H. F. Byrd
Senator A. Willis Robertson
Congressman Edward J. Robeson, Jr.
Mr. C. F. Pinnell

Hallieford, Virginia
6 February 1956

To Whom It May Concern:

Re: Dredging of Channel Entrance
of Queen's Creek

Gentlemen:

I, Earl R. Hudgins, as a citizen of Hallieford have been living on Queen's Creek for the past forty (40) years and have earned my living from fishing and oystering on the waterways around Queen's Creek, have found it impossible to enter said creek to reach my harbor. This shallow channel condition has existed for the past eight (8) years; and further, since tropical storms have frequented this area, it has become even worse.

Since this condition has existed, I have had to harbor my boat twenty (20) to thirty (30) miles distant from my regular harbor on Queen's Creek, in order to operate my seafood business.

I operate a vessel of fourteen (14) net tons with a draft of five (5) feet. In my seafood business I employ six (6) persons and support approximately fifty (50) persons from this vicinity.

This channel situation has become an emergency to all residences of Queen's Creek since the storms of 1954 and 1955.

I urgently request your Committee to do whatever possible to have this condition corrected.

Respectfully submitted,

/s/ Earl R. Hudgins
EARL R. HUDGINS

Port Haywood, Va.
Feb. 7, 1956

Capt. T. L. Brooks
Hallieford, Va.

Dear Capt. Brooks

In regards to our conversation about the oysters I have lost in the past three years due to a very narrow and shallow channel at the entrance to Queens Creek from Hills Bay. To the best of my knowledge I have lost about 8,000 bushels since 1953-1954-1955. At times the smallest outboard motor skiffs could not get in to sell their oysters to me.

I hope that in the near future there will be a way provided to give the waterman in this section of Mathews County a better waterway. Hoping this letter will be some help to the cause.

I remain yours very truly

/s/ Walter G. Mitchum
Oyster Buyer in
Queens Creek

Laban, Virginia
February 20, 1956

Corps of Engineers, U. S. Army
Office of The District Engineers
Washington District
Washington 25, D. C.

Re: Garden Creek, Mathews County, Va.

Dear Sirs:

In reply to your request for dollar and cent figures as to the damage done in the drainage area of Garden Creek which was a result of the hurricane Connie last August, 1955, I have made a survey of about 125 homes which are located in the area drained by Garden Creek. Damage, at least the greatest damage, was not caused by wind alone. The greatest damage was caused by the 9½ inch rain which occurred in one day and the seawater coming in over the beach. This caused our creek area to be flooded and there was no way for the water to get out which meant that crops, gardens, orchards, poultry, and other things perished. This filthy, stagnated water stayed on our land and over our State roads in the drainage area for at least seven days. This was so simply because of insufficient drainage. Therefore, it is hard to state the damage which was done as it runs over a period of years after these storms.

However, I can state from the survey which I made by contacting people in the affected area that the damage caused by the storms of last summer amount to at least $25,000 to $50,000. Then, with the hot sun shining on this large area of stagnate water bottled up over the country side it seems to me to be very detrimental to the health of human beings and livestock as well. Also, our county was aggravated day and night by the greatest swarm of mosquitoes that anyone had ever seen which surely created health problems.

I hope and trust that something can be done so that Garden Creek can have an opening and thereby provide drainage for this area.

Very truly yours,

/s/ C. T. Diggs
C. T. Diggs

(P.S. If you gentlemen demand the indorsement of the supervisors of Mathews I shall be glad to furnish another copy at once.

State of Maryland
STATE ROADS COMMISSION
108 East Lexington Street
BALTIMORE 3, MD.

March 27, 1956

Colonel Ray Adams
District Engineer-Washington District
Corps of Engineer, U. S. Army
First & Douglas Streets, N.W.
Washington 25, D. C.

Dear Sir:

In reply to your letter about Hurricane Damage, the following information is furnished. Enclosed find summaries of various projects in your district that were repaired by the Maryland State Roads Commission during the past few years. These repairs were required due to Hurricane flood damage and were of an emergency nature. Ultimate repairs will have to be made as soon as money is available. Any assistance by the Federal Government to this end will be greatly appreciated.

If you require any further information, please inform this office.

Very truly yours,

/s/ A. L. Grubb
Albert L. Grubb, Chief
Bureau of Bridges

HBH/d

STATE ROADS COMMISSION

HURRICANE DAMAGE March 27, 1956

SM-320-x-514
Md. 5
Point Lookout Causeway - St. Mary's County

Description: 1800' Causeway between Chesapeake Bay and Lake Conoy connecting Point Lookout to Mainland in St. Mary's County. Roadway was 16' wide with macadam surfacing at approximate Elevation 5.00.

Damage: Hurricane Wave Action and High Water washed out approximately 600' of roadway and embankment to Elevation 0.00±.

Temp. Repair: S. R. C. Maintenance Crews replaced embankment and temporary roadway and constructed sand bag slope protection adjacent to washed out section approximately 660' long on bayside only.

Cost = $15,265.19

Ultimate Repair: Raise grade at Roadway to approximate Elevation + 6.00, construct slope protection and pave roadway.

Estimated Cost = $60,930.00

SM-316-x-520
Md. 249
St. George Island - St. Mary's County

Description: Existing structure over St. George Creek between Piney Point and St. George Island is 1230' long, Multiple Span Timber Bridge on Timber Pile Bents, with 12'± Roadway.

Damage: High Winds, High Water and Wave Action washed away approximately 200' of superstructure and damaged 10 bents.

Temp. Repairs: Rebuilt pile bents, placed Steel H Beams and new deck.

Ultimate Repairs: Rebuild new 400' bridge at medium high level, construct new approach causeways on each side about 800' long and new approach roadway approximately 2500' long.

Estimated Cost = $305,000.00

Ch-304-x-514 March 27, 1956
Rte. 224 over Mattawoman Creek
at Mason Springs in Charles County

Description:	Double 23' span concrete slab bridge over Mattawoman Creek.
Damage:	Bridge was washed out by High Water. When water receded the velocity of water scoured the center pier and caused the entire bridge to collapse.
Temp. Repairs:	Constructed temporary steel beam and timber 3 span bridge (60' +) and approximately 500' of approach roadway for detour road. Cost = $17,767.67
Ultimate Repairs:	Improve stream channel, construct new bridge, raise roadway above High Water, improve alignment and incidental road and bridge work. Estimated Cost = $210,000.00

Ch-305-x-514 March 27, 1956
Rte. 233 over Zekiah Swamp near
Beantown in Charles County.

Description: Existing structure was a single 30' span concrete Girder on gravity abutments.

Damage: High water scoured one abutment and caused abutment to fall forward. The Girders supported by this abutment dropped approximately 2½' and came to rest on tilted abutment.

Temp. Repairs: Steel beams were braced between abutments to prevent further tilting and other steel beams were placed under the concrete girders and supported on timber piles to prevent further settlement. An additional timber span was built to increase waterway and fill cavity on rear face of abutment caused by tilting of the abutment.
Cost = $10,465.89

Ultimate Repairs: Replace Bridge with larger span bridge to be supported on piles, improve and raise Roadway Approaches above High Water.
Estimated Cost = $129,000.00

PHONE: GREAT MILLS 80-W-2

SCOTLAND BEACH HOTEL
ON THE BEAUTIFUL CHESAPEAKE BAY
SCOTLAND BEACH, MARYLAND

February 21st, 1956

Corp. of Engineers, U. S. Army,
Office of the District Engineer
First and Douglas Sts., N. W.,
Washington, D. C.

Gentlemen:

In accordance with our conversation at the meeting held in Leonardtown, Md. at the Court House on February 14th, 1956, I am respectfully submitting approximate damage to the business and homes at Scotland Beach, Md, caused by water from hurricanes Hazel, 1954 and Connie and Diane 1955:

Scotland Beach Hotel property, bulkheads, floors, foundations etc., approximate loss $8,000.00.

There are sixty five privately owned homes and cottages on the Beach, which were damaged by high tide waters and their loss was approximately $7,500.00.

During the eighteen years I have owned the Scotland Beach Hotel property, I have lost about 165 feet of land on the Chesapeake Bay. Of this amount, about 20 feet during hurricane Hazel and 50 or 60 feet with Connie and Diane. The other land was lost during this period of years from high tides caused by bad Nor'easter and Sou'easter storms. I attribute this fact from Point Lookout to Point No Point, it is the widest part of the Chesapeake Bay and during these storms it causes the tides to become much stronger in this area.

Unless something is done very soon to help us save what land we have left, we are afraid there will not be any Scotland Beach in the next fifty years.

If the Federal Government can give us any financial aid to save our land, business and homes, we will greatly appreciate same.

Very truly yours,
/s/ May Helen Morgan
Owner
SCOTLAND BEACH HOTEL

Swimming Boating Fishing

February 21st, 1956.

Corps of Engineers, U. S. Army
Office of the District Engineer,
First and Douglas Sts., N. W.,
Washington, D. C.

Gentlemen:

In accordance with our conversation at the meeting held in the Court House at Leonardtown, Md., February 14th, 1956, I interviewed the owners of the Point Lookout Hotel and some of the owners of privately owned homes and I submit the following information:

Hotel property approximately $10,000.00 loss and about 40 to 50 feet of land.

Homes approximately $6,000.00.

Trusting this is the information you desire, I am,

Very truly yours,

/s/ May Helen Morgan

JOSEPH F. NEBEL COMPANY
INC.
BUILDERS
3408 WISCONSIN AVENUE, N. W.
WASHINGTON 16, D. C.
EMERSON 2-2178-2179-2180

February 14, 1956

Colonel Stephen E. Smith, U. S. A.
District Engineer
Corps of Engineers
24th and Maryland Avenue
Baltimore, Maryland

Dear Sir:

It is noted that you will hold hearings to learn the views and desires of local residents on shore protection.

I am the owner of approximately 130 acres of land with a front on Chesapeake Bay of approximately 3/4 mile located at Point-No-Point, St. Mary's County, Maryland.

Coast and geodetic survey shows that the shore line is being cut back about four feet per year. There are nine (9) cottages located on this shore.

In an attempt to save the shore, I have experimented with the use of three foot concrete well rings as groins and at the spots where these have been used in the past three years, it has proven fairly successful. However, it is an expensive proposition.

During the past three months, the waters of the Bay have eaten into another section of the shore and is giving me quite a bit of concern. If your Engineers come up with some other idea, or if the Government is going to do something about this shore protection, please advise me.

Very truly yours,

JOSEPH F. NEBEL COMPANY
/s/ Joseph F. Nebel
Joseph F. Nebel
President

JFN:vlp

COUNTY COMMISSIONERS OF CALVERT COUNTY
PRINCE FREDERICK, MARYLAND PHONE 58

February 7, 1956

Corps of Engineers, U. S. Army
First and Douglas Streets, N. W.
Washington, D. C.

Gentlemen:

It is with deep concern and interest that we the undersigned join in your meeting today for the purpose of discussing hurricanes, and their extent they effect the Patuxent River area, particularly the northern shore of said river.

It is difficult to estimate the damage resulting from these menacing storms, as most cases are of a personal character, and no values are available. However, it is safe to say they will run into many thousands of dollars, and even to the individual, the cost is beyond their ability to cope with.

On the Patuxent, tides often reach as much as four or five feet; wave damage is not to bad until the wind changes, which in most cases is after the "eye" has passed. Then the Calvert side of the Patuxent taken a heavy pounding from the southwest. On the bay of course most damage is from the northeast, and due to the width of the bay a greater damage results.

The first need is a more reliable and timely warning. This has not been to accurate in the past. Some local organization in each county should be designated to receive and distribute prompt and reliable information.

There is a great need for protective works to save valuable property which in most cases is beyond the capability of the owner to protect. Harbors for small boats, some government assistance, both as to physical assistance in such a project, and low interest financing for those receiving storm damage.

The most practical safe guard our community has found to be is jetties or groins if properly designed are of considerable help; but when waves reach five and six feet on a high tide, they alone do not answer.

COUNTY COMMISSIONERS OF CALVERT COUNTY
PRINCE FREDERICK, MARYLAND PHONE 58

February 7, 1956

We respectfully submit this for any help it may be and hope something worth while will result from the committee's study.

Yours truly,

COUNTY COMMISSIONERS OF
CALVERT COUNTY

/s/ Guy Elliott

/s/ G. W. Dorsey
George W. Dorsey, President

/s/ J. Mann Danton

/s/ Slezikiah C. Elliott

/s/ Ballard Rogers

/s/ A. Lionel Parks

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF MARYLAND

UNIVERSITY OF MARYLAND
U. S. DEPARTMENT OF AGRICULTURE COOPERATING

EXTENSION SERVICE

La Plata, Maryland
January 24, 1956

Colonel Ray Adams, District Engineer
Corps of Engineers, U. S. Army
1st and Douglas Streets, N. W.
Washington 25, D. C.

Dear Colonel Adams:

I may not be able to attend your meeting at Leonardtown on February 14,1956. Perhaps some of the following could be considered in your report.

The greatest damage in the past 34 years of my experience was Hurricane Hazel in 1954 and by Connie and Diane in 1955. Hazel demolished about 125 farm buildings and damaged about 100 more. Most of the demolished buildings were tobacco barns costing about three to four thousand dollars each. Along the river frontage the greatest damage was at Popes Creek, Rock Point, Benedict and Chapel Point. My estimate of the damage to buildings along shores and inland would be about $100,000, probably equally divided between wind and wave action.

Connie and Diane in 1955 did not cause too much wind damage, but inland crops were flooded. Our tobacco crop is estimated to be about five million pounds below average yield due to these storms. Although the short crop may bring a higher price, we have lost in this crop alone approximately two million dollars, and probably about $50,000 loss in other crops.

Only a small percentage of cropland was inundated and the loss would be small.

Shore line erosion was heavy in some places along the Wicomico and Potomac. At Stoddards Point on the Wicomico the erosion was so great in front of the West Hatton dwelling that it cost the owner about six thousand dollars to repair the damage. Shore line erosion was also heavy near Swans Point on the Potomac.

With the experience of three hurricanes in approximately one year, I believe the people are paying more attention to the warning service and doing what they can to prepare for it.

Very truly yours,

/s/ P. D. Brown
P. D. BROWN
County Agent

PDB:jbb

From the Minutes of October 28, 1954

Present- members of the Disaster Commission, Am. Red Cross and Civil Defense

L. S. Alvey, Pres. County Comms.
C. B. Guy, member " "
E. L. Stone, " " "
Wm. O. E. Sterling, Atty

M. C. Thompson, Jr., County Director, Civ. Def.
R. B. Duke, Asst. "
Paul Hayward County Chrmn ARC
Mrs. E. Rapp, Director, County Welfare

Shirley Ewing, State Disaster Comm
Col. C. L. Lee, USN " "
M. R. Brooks, State ARC
Col. Matthews, " Civ Def
Chas. Leach Federal " "

Damage estimated as follows

Barns	$690,000.00
House roofs	450,000.00
Boats	160,000.00
Piers & bulkheads	140,000.00
Live stock & poultry	6,000.00
Crops & tobacco	230,000.00
Roads & bridges	30,000.00

Mr. Brooks advised that where a boat is damaged and the repairs cost $800.00 if owner has but $500 ARC will assist with $300.00. Where homes are destroyed ARC assist with from $5 to $5,000. ARC will have someone in office to assist in filling out forms.

Hurricane Hazel - Cost of Repairs

State Roads	$ 6,820.86
County Roads	3,241.07
Point Lookout	2,875.00
St. Georges Is. Bridge	10,561.00
	$23,497.93

Hurricanes Connie and Diane -

State Roads	$41,271.48
County Roads	10,869.27
Point Lookout	14,909.78
	$67,050.53

Estimated Cost for Permanent Repairs to Point Lookout $100,000.00

THE TAINTON COMPANY

3100 ELM AVENUE
BALTIMORE 11, MD.

BELMONT 5-3130

April 24, 1956

Army Corps of Engineers
Potomac and Patuxent
River Command
Washington, D. C.

Gentlemen:

In view of your well-known interest in the preservation of our shore lines, I am writing this in the belief that you might wish to be acquainted with recent damage done to some of the high banks on the Patuxent, fronting on Broomes Island, in St. Mary's County. These banks are generally opposite the blinker light off Broomes Island.

This damage was initiated by some of the recent hurricanes, particularly Hurricane Diane, last year when excessive rainfall, combined with strong wave action, caused landslides in which the protective covering of locust trees and honeysuckle were dislodged, leading to severe undercutting of the banks. Because of the rather unique nature of these cliffs, this may be of some importance. Our reasons for believing the preservation of these banks may be in the National interest are as follows:

1. The cliffs rise approximately 85 to 90 ft. almost vertically from the Patuxent River. They afford a very sweeping view over a portion of Calvert County. This commanding position might be of importance in the event of National catastrophe or disaster.

2. The banks contain deposits of prehistoric fossils and other shells, which, while they are similar to the deposits in the cliffs in Calvert County known as Scientists Cliffs, are of a different formation and are unique in many ways, so I am told.

3. The washing away of these banks pollutes the river with heavy deposits of fine clay which settles out of the bottom. It takes a long time for the river to clear itself and this tends to ruin the underwater vegetation with possible adverse effects on migratory wildfowl.

I own a small piece of property at the highest point on these cliffs and have had an opportunity over the past several years to observe the ease with which the beach may be built up and extended out into the river by any sort of obstruction stretching out at right angles along the shore lines. It is my belief that any jetties constructed similar

to those at Ocean beaches would be effective in building up a wide beach and preventing or minimizing further damage to these cliffs. However, even if the various, small property holders along this section of the shore line were able to do this, it might cause erosion of some other section of shore line somewhere else. In other words, the effect of any such jetties would have to be considered in relation to the whole area, and not just to one small section of beach.

It is my understanding that, prior to the hurricanes of the last two years, little or no erosion of the main section of these cliffs had occurred for many years. This was attested to by the size of many of the trees growing on the bank. One section, at the Northwest end, in which erosion has been occurring indicates that, once the hard facing of the cliffs is destroyed, erosion is a rapid process.

In sending you this letter, I am acting as spokesman for the various property owners. We have read articles of the efforts of the Army Corps of Engineers to maintain and minimize erosion of our shore lines and have heard enthusiastic reports of some of the work which the Corps has done on the Potomac River. These cliffs, with their fossils, are definitely unique and we felt that you might wish to have the situation drawn to your attention in ample time and before their deterioration becomes catastrophic.

Very truly yours,

/s/ Erith T. Clayton
Erith T. Clayton

ETC/mkl
CC: Messrs. J. R. Tippett, Jr.
William Brown
J. E. Capps
James Jacobsen
R. Hewitt
W. Lawrence

DEPARTMENT OF PUBLIC WORKS
Of Prince George's County
Court House
Upper Marlboro, Md.

ARTHUR W. TAYMAN, Administrator

March 22, 1956

Colonel Ray Adams
Corps of Engineers
District Engineer
First and Douglas Streets, N. W.
Washington 25, D. C.

Re: Treasure Cove Subdivision - Hurricane study.

Dear Colonel Adams:

We have received your public notice No. 503 concerning the public hearing to be held to make an examination and survey with respect to hurricanes, in areas where severe damages have occurred.

This letter is in reference to these hearings and to inquire as to what means are available to check beach erosion along the Potomac River in Prince George's County.

We would like to bring to your attention, particularly the fact that considerable erosion is occurring along a public road in the Treasure Cove Subdivision in our County, which lies immediately South of the Government Park of Fort Foot.

We will appreciate your aid in advising us how this erosion might best be checked and if Government funds are available for such work. I understand that a similar project is now under way at Colonial Beach in order to protect a public road at that location.

Sincerely yours,

/s/ J. H. Marburger, Jr.
J. H. Marburger, Jr.
Acting Administrator

JHM/lab
CC: Mr. Richelt